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Graph added 1

Nottingham

A. 3.

THE

CONCHOLOGY OF NOTTINGHAM;

OR

A POPULAR HISTORY OF THE RECENT LAND AND FRESH WATER MOLLUSCA FOUND IN THE NEIGHBOURHOOD;

BY

E. J. LOWE, ESQ., F.G.S., F.R.A.S.,

Member of the British Meteorological Society, Member of the Geological Society of Edinburgh, Honorary Member of the Penzance Natural History and Antiquarian Society, Honorary Member of the Orkney Natural History Society, &c., and Author of a "Treatise on Atmospheric Phenomena," "Prognostications of the Weather," "The Climate of Nottingham," and various Papers on "Solar Spots," "Meteors," "Zodiacal Light," "Mollusca," &c., published in the Transactions of the British Association, Royal Astronomical Society, Linnœan Society, Zoological Society, &c.

BIBLIOTHECA BODLEIANA

LONDON:
C. A. BARTLETT, 32, PATERNOSTER ROW.
NOTTINGHAM: R. SUTTON, BRIDLESMITH-GATE.

1853.

Gough Add. Nottingham

DEDICATION.

TO

JOHN LEE, Esq., LL.D., F.R.S., F.R.A.S., F.S.A.,
F.G.S.. M.B.M.S., &c.

My dear Sir,

To you who are so well known to the scientific world, not only for your knowledge of the various branches of science, but as the patron of science itself, the dedication of this small work I fear is but a poor token of my respect and esteem for the kind assistance you have always given me.

I am, my dear Sir,
Yours most faithfully,
EDWARD JOSEPH LOWE.

Observatory, Beeston,
April 26, 1853.

THE CONCHOLOGY OF NOTTINGHAM.

INTRODUCTION.

Conchology, in the idea of the million, is connected with the sea, for there are but few persons, comparatively speaking, who are aware of the great number of shells which are to be found inland.

Every river and lake has its conchological inhabitants, and even the ditches swarm with molluscous animals, some clinging to aquatic plants, others upon and under stones, buried more or less deeply in water, floating on the surface of the stream, crawling on the ground, or buried in the mud and gravel; these are the fresh-water species. Land shells are equally abundant; we meet with them under stones, decaying leaves, at grass-roots, in our cellars, under the bark of trees, amongst the stunted grass on the barren moor, mosses in the woods, and on the debrís left by floods along the banks of rivers and dikes.

Molluscs are very diversified in form, colour, transparency, and magnitude; it is therefore surprising this interesting branch of natural history is so little known, as it would form a pleasing study in our walks and rambles, and a varied addition to our cabinet curiosities. The neighbourhood of Nottingham is very prolific in shells; all the species we find, however, are not strictly British; some few of them have been accidentally introduced from other countries, and are now naturalized and abundant; consequently we are compelled to include them amongst our British species, merely recording the fact that they were introduced into this island.

The shell, or covering which protects these animals, is composed of carbonate of lime, which they obtain from the alkaline earth in contact with the atmosphere. With these facts before us we are necessarily obliged to look upon each mollusc as a chemical composition, drawn into action by chemico-electrical excitement, or, in plain words, the vital action of the animal.

It is to the remains of shells that we are indebted for the basis of limestone mountains. From this valuable branch of natural history we learn several wonderful truths; on examining their fossil remains we find that great disturbances have taken place on the earth's surface since the creation of the world. Fossil marine shells are procured from localities far beyond where any ocean could have conveyed them under causes at the present time existing: the summits of the Andes and Pyrenees are not without them. Thus we discover former inhabitants of the ocean deposited 14,000 feet above the level of the tide.

Land and fresh-water shells are divided into two classes; namely, bivalves, or those which have two similar shells united by a hinge at the summit, and univalves, which are formed of one continuous whorl or coil. Land shells are, without an exception, univalves.

The *convolutions* of shells are called whorls. The *hinge* in bivalves, which unites the two halves together, is in some instances furnished with teeth, and almost always joined by a firm *ligament*. * Such shells which attach themselves to rocks, pieces of wood, or to other shells, adhere by a thread-like substance, called a *beard*. The *umbilicus* in a shell is a hollow which is more or less wide and deep, in the centre of most univalve shells. The *operculum* is a shell-like substance attached to several of the mollusca family, which, when the animal is within, completely closes the entrance (of the shell) and thus shields it from danger. A *convolution* is a whorl or coil, and the number of convolutions are the number of coils or circles rolled upon each other, the exterior whorl being the largest, and the innermost one ending in a point. The *epidermis* is the outer covering which gives lustre to the shell. The *carina* is the keel or edge of the shell; and the *aperture* is the opening. The general terms are in this manner briefly explained.

The eyes of mollusca are placed in the horns of the animal. Molluscous animals are generated in two modes, one branch depositing membraneous eggs, whilst another group are ove-viviporous, that is, bring forth their young alive, and in shells. In this latter manner does Paludina-vivipora produce its offspring. I have examined this shell microscopically. Having obtained some females, and destroyed them by placing them in hot water, from ten to a score shells (or young ones) were extracted from each, in various stages of perfection; besides these there were about half-a-dozen milky-white egg-shaped substances, in some of which the form of the shell was, at the spiral end, plainly detected.

Parasitical insects are found on the bodies of mollusca, and worms in their intestines.

Molluscous animals vary considerably in the period at which they arrive at maturity. Most Helices begin to breed before they have attained their ordinary growth. They also vary in the number of eggs which they lay at one time, certain of them only depositing three or four, whilst others bring forth upwards of a hundred.

M. Bouchard has made some interesting observations on the number of eggs laid at one time, the various months in which they are laid, the time they take to hatch, and the number of months elapsing before the animal arrives at its adult age. From his researches we shall borrow from time to time.

Mollusca have the power of re-modelling, or mending such portions of their shells which may have been accidentally broken, but not so perfectly but what these places may be instantly recognized.

Animals inhabiting shells lie dormant during the winter months; some few, however, are occasionally aroused from their torpour on a warm sunny day. They become inactive about October, and remain more or less so until April. Limneus pereger may occasionally be seen moving about actively in the mud whilst the surface of the water is frozen over; and a few warm days have invited the Helix or snail family to search for food, but on the first return of frost they again become inactive, closing the aperture of their shells with a glutinous substance. Last year Helix aspersa began to crawl about on the 1st of March, but cold weather returning on the 4th, they again became motionless until near the end of the month. Being in the vale of Aylesbury on the 3d of April, I noticed the following shells abroad near Hartwell House:—Helix pulchella, Helix carthusiana, Helix rotundata, Azeca tridens, and Bulimus obscurus. On the 5th of April, Helix rufescens were seen in great numbers at Tring, in Buckinghamshire. In this neighbourhood but few water shells were noticed until the second week in April; and, up to the 23d, I could find none in the Trent, nor could I per ceive Neritina fluviatilis (adhering to stones covered with water), although last year, and again in a few subsequent days, they were abundant. During the present January Limneus pereger and Planorbis cornea were several days noticed moving about, and in February Helix hispida, Helix lucida, and Vitrina pellucida.

Certain water shells, such as pass their lives in ditches, can remain alive for a length of time when their respective localities have been dried up by continued fine weather; at these periods Planorbis vortex seals the aperture of its shell with a white calcareous cement. In some experiments I found that the large coil shell (Planorbis cornea) could be kept a month out of water, and survive on again being placed in their native element. A land shell (Helix hispida) also was retained under water for a fortnight, and four specimens our of five remained alive. Some shell fish brought from Valparaiso, which were packed in cotton for upwards of a year, revived again. Snails, shut in a box with air, close themselves in their shells, and will lie dormant for many months.

Shells are in various ways used as an article of commerce. They are manufactured into many beautiful commodities, are used by painters for containing different colours, the sea cockle is the circulating medium of Angola; in jewellery, we are indebted to the Pearl oyster, and less frequently to the English Unio Margaritiferus for beautiful pearls; and many are used to supply the necessaries of life, amongst these are the oyster, mussel, cockle, perriwinkle, Pecten maximus, &c. Amongst European fresh-water shells, although none are eaten in England, yet in the south of Europe the Unio tribe are devoured with avidity, either roasted and drenched with oil, or scattered over with bread crumbs and scalloped. Amongst the land shells Helix pomatia is esteemed by the French; Helix formatio, during Lent, by the Romans; and, in England, we have an annual snail feast, held at Newcastle, at which our large garden snail-shell (Helix aspersa) is eaten.

It will, perhaps, be interesting to know the authors names who have written on this subject. The most notable of them may be thus briefly enumerated, with the years in which they first wrote. Shroeter in 1771, Müller in 1773, Pennant in 1777, Montagu in 1803, Donovon, Rackett, and Maton in 1804, Drapernaud in 1805, Brard in 1808, Montfort in 1810, Laskey in 1811, Alten in 1812, Turton in 1814, Brown in 1817, Lamark in 1818, Férussac, Jeffreys, and Leach in 1820, Grey and Pfeiffer in 1821, Nilsson in 1822, Sheppard in 1825, Berkeley in 1828, Alder in 1830, Jenyns in 1832, Rossmasser in 1835, Nunneley in 1837, Forbes, Fleming, Johnston, Michaud, Potiez, and Strickland in 1838, Thompson in 1840, and Macgillivry in 1843. Since 1843 we have Grey's edition of Turton's shells, a work by Captain Brown, and the British Mollusca, a splendid treatise now coming out, by Forbes and Hanley.

In my researches on this subject I am greatly indebted (for many specimens of shells, and various information) to Mr. Bean, of Scarborough; Mr. Alder, of Newcastle; Mr. Gough, of Kendal; Lieut. Hardy, of Bath; Mr. Jeffreys, of Swansea; Dr. Lee, of Hartwell; Sir Oswald Moseley, of Rolleston Hall; Mr. R. T. Millet, of Penzance; Mr. Thompson, of Belfast; Mr. J. G. Tatem, of Reading; the Rev. J. Peach, of Holme; the Rev. W. Clark, of Bath; Mr. Winstanley, of Chaigeley Manor; Mr. Graham, of Darlington; and the Rev. J. Goodall, of Dinton. I am also indebted to Mr. F. E. Swann, for the drawings of the different shells which illustrate this work, and to my brother, Mr. A. S. H. Lowe, for engraving those drawings. I take this opportunity of thanking those gentlemen for the kind manner in which each has responded to my requests.

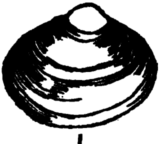
The names given to the shells are those of Professor Forbes and Mr. Hanley, as printed in their "British Mollusca;" and the localities (of shells) in this neighbourhood, unless otherwise recorded, are on my own authority.

CYCLADIDÆ.

This is an interesting group of bivalve fresh-water shells, to which the Cyclas and Pisidium families belong. They inhabit rivers, lakes, and ditches, living buried in the mud. They are all ovoviviparous, and thrive well, and breed, when in confinement.

CYCLAS RIVICOLA (The River Cycle). *Leach.*

Figures 1 and 2.



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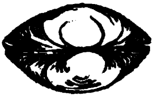

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This is the largest of the Cyclas family. It is nearly oval, tolerably ventricose, opaque, and rather strong.

The colour of the shell is brownish-green, with usually several dark zones; it is sometimes, however, nearly black. The umbones are tumid and obtuse, and paler in colour than the other parts of the shell. The interior is blueish-white. The breadth of the shell is ten-twelfths of an inch, its length eight-twelfths, and its ventricoseness is little more than half-an-inch.

The river cycle is rather abundant in the river Trent, near Beeston Ryelands; nevertheless it is difficult to obtain in that locality. It is found also in the river Soar, near the Red-hill, at Thrumpton. Several specimens have been procured from the canal, half a mile below where it joins the Trent, at Beeston, yet they appeared in an unhealthy condition. One dead specimen I dredged in a brook near the Nottingham and Derby Railway, at Lenton; in all probability this had been deposited there in the time of a flood.

Amongst the more distant localities, it grows to a large size in the river Trent, near Barton (Brown); it is found in great abundance in the river Thames (Forbes), the New River (Bailey), the river Lea (Hanley), the Yorkshire rivers (Winstanley), Yorkshire streams (Bean), and the canals at Leamington (Thompson).

Professor Forbes represents it as being found in France, Germany, and Belgium, and, in a fossil state, in the south of England, in the fresh-water beds of the Pleistocene formation.

CYCLAS CORNEA (The Horny Cycle). *Linneus.*

Figures 3 and 4.

3.

4.

Cyclas cornea is not nearly so large as C. rivicola. It varies considerably in its form, though mostly very round. It also varies in colour, but is usually of a brownish hue. The umbones are, in nearly all the specimens, broad. It is one of our most abundant species. The length of the shell is nine-sixteenths by seven-sixteenths broad. The usual size in this neighbourhood is five-twelfths of an inch long, half an inch broad, and four-twelfths of an inch in ventricosity; but in this latter respect there is much variation.

The diversity in form and size of the Horny Cycle has occasioned conchologists to recognize several seemingly distinct varieties, yet, most probably, it is locality only, which causes the variation. Mr. Gough has sent me two varieties, found near Kendall; the first in the mud of a small mountain tarn, which is very diminutive, almost white, and very slightly ventricose; the second from ditches on peat bog, near Morcamb Bay, it varies but little, except in size, from the common form of Cyclas cornea. A much more distinct variety was sent to me from Darlington, in Durham, by Mr. Graham;

it is less ventricose than any other variety which I have seen. There is also a straw-coloured variety, found in the vicinity of Beeston, which is only slightly ventricose, and semi-transparent.

The localities are too numerous to mention; we shall therefore only give a few of the principal ones. The river Trent, near Beeston; the river Leen, near Bulwell; the various brooks at Lenton, Beeston, Bulwell, Highfield House, Attenborough, Sawley, and in the Nottingham Meadows. Common in ponds at Penzance (Millet), Bristol and Wiltshire (Montagu), the river Thames (Millet), Gateacre near Liverpool (Winstanley), Kendall (Gough), Newcastle (Alder), Darlington, Durham (Graham), Dublin (Brown), Germany (Pfeiffer), and Sweden (Nilson).

Professor Forbes says it is fossil in the fresh-water strata of the Pleiocene ages, in the valley of the Thames.

CYCLAS CALICULATA (The Capped Cycle). *Draparnaud.*

Figures 5 and 6.

5

6.

This delicate, semi-transparent, almost white shell, is much flatter than the other members of the Cyclas family, being very compressed, except near the umbones. The umbones are narrow, project, and, as the name of the shell implies, represent caps. It is a very shining shell. The specimens procured near Beeston are three-eighths of an inch broad, one-third of an inch long, and one-fifth of an inch ventricose. Forbes gives the size as occasionally seven lines by five and a half lines.

It inhabits stagnant water, and, although not a common shell, it is locally abundant. There are three localities in this neighbourhood where it is found, and in each of them it does not spread over more than a score yards. These localities are, a brook which runs below the village of Beeston, another at Highfield House, and a third in another brook at the same place. The specimens are much larger at Beeston. The more distant places are, Clumber Lake (Jeffreys), in a small pond at Corby, Cumberland, Ulleswater, and the Westmoreland Lakes (Brown), Prestwick Car, Northumberland (Brown), near Newcastle (Alder), Manchester (Brown), small brook communicating with river Lea (Hanley), at Scarborough (Bean), at Lichfield (Thompson), Hornsea, Yorkshire (Strickland), Brookham Common, Surrey (Jenyns), near Bristol (Jeffreys), near London (Grey), Devonshire and Wiltshire (Montagu); in Ireland, in the Grand Canal, Cork, and Youghal (Thompson), and in Tallagt Pond, Phœnix Park, Dublin (Warren). Forbes's foreign localities are Sweden, Germany, Belgium, France, and Italy.

I am not aware that it has ever been found fossil.

The Pisidiums differ but little from the Cyclas tribe, except in size; the animal, however is different, having only a single syphon, whilst the Cyclas has a double one. The hinge has one tooth in the right valve, and usually two teeth in the left, and also lateral teeth.

The ligament is situated on the shorter side of the shell; but in the Cyclas it is on the longest side.

PISIDIUM AMNICUM. *Müller.*

Pisidium amnicum is much larger than any other branch of this family, being 5¼ lines in length and 3¾ in breadth. The anterior side of the shell is much produced and tapering, whilst the hinder side is short and blunt. The umbones are not prominent. Very conspicuous longitudinal striœ-like raised markings are spread over the shell. It is somewhat of a olive-ash colour, and the interior is blueish-white.

Rivers and gentle streams are its favourite haunts, partly burying itself in the mud.

An abundant shell, although it appears very rare in this neighbourhood, only one specimen having been procured, and this was dredged from a brook which crosses the Railway half-a-mile below the Beeston Station.

It is found in the river Avon, near Salisbury (Maton), in the North Avon (Montagu), in the New River, London (Hanley), the river Thames, at Witney and Henley (Strickland), the river Severn (Strickland), the river Mole, near Guilford (Millet), Bristol and Wiltshire (Jeffreys), Bath (Clark), near Wareham, Dorsetshire (Brown), Scarborough (Bean), Newcastle (Alder); in Wales, near Swansea and Cardiff (Jeffreys); in Scotland, near Edinburgh (Brown); and in Ireland, in the river Main and the river Liffoy, at Limerick, Miltown, Malbray, Ballitore, and Kildare (Thompson), and Dublin (Brown).

Generally distributed throughout Europe. Germany (Pfeiffer), Sweden (Nilson).

It occurs fossil in the Pleistocene fresh-water beds of the river Thamos (Forbes).

PISIDIUM CINEREUM. *Alder.*

This species is next, in point of size, to Pisidium amnicum. It is rather compressed in its form. The epidermis is shining, and of a greyish colour. The umbones are broad. Its length is one-fifth of an inch, and its breadth near two lines.

An inhabitant of ponds.

Pisidium cinereum is placed amongst our Nottinghamshire shells on the authority of Jeffreys, who discovered it in Clumber Lake. I have not as yet found it. The recorded localities are, north of England (Alder), Preston (Gilbertson), Scarborough (Bean), Croydon Canal and near Swansea (Jeffreys), Bath and Exmouth (Clark). It is not common, though generally distributed, in Ireland (Thompson). In Scotland, Balmacarra, West Ross (Jeffreys).

Forbes says it is an inhabitant of Sicily.

PISIDIUM HENSLOWIANUM (The Appendiged Pera). *Sheppard.*

This shell differs but little from Pisidium pulchellum, excepting in the curious eave-like projections on the umbones, which P. pulchellum has not. The shape is obliquely ovate, The extreme size is 2½ lines in length , and 2 lines in breadth.

Everywhere this is a rare shell. It is met with in rivers and ditches.

I have included it in this catalogue from one specimen only, which was found in a moist ditch, along with other Pisidia, near Beeston Railway Station.

Other localities given are, ditches running into the river Cam, at Cambridge (Prof. Henslow), also a few miles below Cambridge (Jenyns), in the river Thames, near Henley (Strickland), near London (Grey), Kent and Dorset (Montagu), Suffolk (Sheppard), Cadley, near Swansea (Jeffreys) and at Finnoe, in Tipperary (Thompson). Inhabits Germany (Forbes), and Sweden (Nilson).

Professor Forbes records it as found fossil in the fresh-water Pleistocene beds of Grays, and elsewhere in the South of England.

PISIDIUM NITIDUM (The Shining Pera). *Jenyns.*

This Pisidium is somewhat similar in shape to Pisidium pusillum, being slightly more convex than that species. The umbones are rather obtuse. The epidermis is very shining. The greatest size is one-eighth of an inch long, and not quite so much broad.

Found chiefly in clear ponds.

As with Pisidium cinereum, I record this shell on the authority of Mr. Jeffreys, who procured it in Clumber Lake.

The distant localities are, ditches in Battersea Fields, and in Cambridgeshire (Jenyns), Sandwich, Kent (Jeffreys), near London (Grey), Worcester (Brown), Preston (Gilbertson), Scarborough (Bean), Northumberland (Hancock), near Darlington (Backhouse), Oxwich, near Swansea, Tenby, and Manorbeer, in Pembrokeshire (Jeffreys), Wolf-hill, near Belfast, Lough Gill Sligo, Portarlington, and Finnoe (Thompson), Cork (Wright), Aberdeenshire (Macgillivray), Bracadale and Portree, in the island of Skye (Barlee).

PILIDIUM OBTUSALE (The Gibbous Pera). *Pfeiffer.*

The form of this shell is a rounded-oval. The umbones are tumid, and slightly prominent. The epidermis is of a dirty-green colour. The largest size it attains is 1¾ lines long, and 1½ lines broad.

Hereabouts it is rare; the only locality I have discovered is a drain near the Beeston Railway Station.

It is found in Cambridgeshire and Surrey (Jenyns), near London (Grey), Kent and Dorset (Montagu), Balmacarra, West Ross (Jeffreys), Arthur's Seat, Edinburgh (Brown), and the Wells of Weary (Brown).

On the Continent it occurs in Sweden (Nilson), and in Germany (Pfeiffer).

PISIDIUM PULCHELLUM (The Beautiful Pera). *Jenyns.*

The *Beautiful Pera* is very various in shape. It has regular concentric striœ. The usual length is 1½ lines by 1¼ lines.

In this neighbourhood it is rare, being, as yet, only found in the Musco-sic dyke, and another near Beeston.

Other habitats are, Cambridgeshire and Surrey (Jenyns), Northumberland and Durham (Alder), Scarborough (Bean), Preston (Sowerby), Birkham Common, in Surrey (Grey), Norfolk (Bloxam), Kent and Dorset (Montagu), Cadley, near Swansea (Jeffreys), generally distributed in Ireland (Thompson), Edinburgh (Brown), and Aberdeenshire (Macgillivray).

PISIDIUM PUSILLUM (The Minute Pera). *Turton.*

The form of this shell is a rounded-oval, with broad umbones. Like Cyclas cornea, it is subject to considerable diversity in its form. The shell is thin and semitransparent, although the epidermis is usually of a dull colour. The length is 1¾ lines, and the breadth nearly 1⅓ lines.

It is an inhabitant of ponds, slow rivers, drains, and marshy places.

Amongst the localities in Nottinghamshire may be mentioned, the river Trent, opposite Clifton deeps, amongst algæ; the Musco-sic brook, near Beeston; a dyke which runs below Beeston; a brook near Highfield House; a moist ditch below the Beeston Railway Station; and amongst grass-roots on the bogs at Bulwell. It is a common English shell, although near here it is nowhere to be found in great abundance.

Pisidium pusillum is procured at Kendal (Gough), Northumberland and Durham (Alder), Preston (Gilbertson), Scarborough (Bean), near London (Brown), Coggeshall, Essex (Hanley), Exmouth (Clark), Penzance (Millet), Swansea (Jeffreys), near Bantry Bay (Jeffreys), Aberdeenshire (Macgillivray), and is abundant in Ireland and Scotland.

Forbes represents it as an inhabitant of Northern and Central Europe.

There is thus, in the neighbourhood of Nottingham every branch of the family included under the head Cycladidæ belonging to the British Isles.

As the Pisidia are all small, I have preferred giving a reference to Forbes and Hanley's "British Mollusca," or Grey's edition of "Turton's Shells," for magnified drawings of each of them, to publishing *natural-sized* illustrations myself.

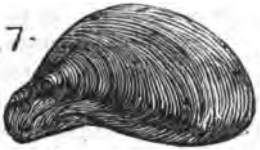
MITILIDÆ.

Amongst the fresh-water shells of Great Britain, there is only a solitary individual belonging to this class, and it is not strictly British, being introduced about thirty years ago.

DREISSENA POLIMORPHA (The Zebra Dreissena). *Pallas.*

Figures 7 and 8.

7.



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The form of this shell bears a striking resemblance to the common *sea-mussel;* its shape, however, varies considerably in the length and breadth, some specimens being much shorter and more ventricose than others. It also never attains the size of our marine species (Mytilus edulis). The colour of the shell is a greenish-brown, with chocolate zigzag markings (somewhat like the striping of the Zebra). These stripes are very apparent in certain specimens, and scarcely to be recognized in others. The internal colouring of the shell is a blueish-white. The epidermis is glossy. Professor Forbes considers a large specimen to be 1¾ inches long, and one inch broad. The largest specimen dredged from the lake at Highfield House measures one inch and eleven-sixteenths by one inch and one-sixteenth; another, more ventricose, 1½ inches by one inch. This shell grows to a much larger size in this lake than in any other locality in the neighbourhood of Nottingham. All the specimens found in the Lenton Canal are small.

The habit of the Dreissena is rather singular, being always found adhering to stones, wood, or to other shells. It is gregarious, and frequently discovered attached together in great numbers.

This shell lives in both fresh and brackish water, and is capable of living for a time in the salt ocean. Conchologists are thus enabled to account for its introduction into Great Britain, for it in all probability found its way into this country clinging to the bottom of vessels. Mr. Sowerby was the first to call public attention to this shell, in 1824, having procured specimens from the Commercial Docks of London. In 1834, Mr. Stark discovered it in the Union Canal, near Edinburgh; and the Rev. M. J. Berkeley, in 1836, found it in the river Nen.

It seldom leaves the substance to which it attaches itself by its beard. Four specimens, which were found clinging to a stone in the lake at Highfield House, have not left it for two years; during this period they increased greatly in size, and gradually became more marked with chocolate stripes, these markings becoming darker in colour.

I can scarcely imagine so conspicuous a shell as Dreissena polymorpha to have been an inhabitant of the British Isles for more than one or two years prior to its discovery by Mr. Sowerby, for it would hardly have been overlooked by such conchologists as Montagu, Donovon, Turton, Grey, and Leach; and yet, if it has been so recently introduced, it is marvellous how rapidly it has become widely spread over our island. I can easily conceive it being soon scattered through our rivers and canals by the agency of vessels and boats, but in what manner it has introduced itself into such isolated lakes as those of Wollaton and Highfield House it is difficult to understand.

Water fowl evidently feed upon the Dreissena, as, on the banks of the lake at Wollaton, numerous dead specimens were found lying about.

The localities in this neighbourhood (in all of which it is abundant) are, the lake at Highfield House, the canal near Lenton, portions of the river Trent, the canal near Beeston, a lake at Wollaton, and the river Soar, at Thrumpton.

It is found, in more distant places, in the London Docks (Grey), Bridgewater Canal and the canal between Manchester and Hull (Brown), river Ouse, Bromham, Bedfordshire (the Rev. J. J. Goodall), Glasgow (Grey), Dublin (Brown).

An inhabitant of Germany, Holland, and Belgium, in the rivers Welga, Danube, Rhine, and Elbe, in the Caspian Sea, and the Black Sea.

As a fossil it is found in Transylvania.

UNIONIDŒ.

I have a difficult task before me in endeavouring to describe this most varied class of British shells, for the diversity of form is so great that doubtless the young collector will be puzzled, and feel inclined to recognize many varieties, when a more intimate knowledge of this class will, in time, enable him to pronounce them as only another form of the same shell. In giving a description of the Unio and Anodonta tribe, I shall confine our delineation to the most permanent shape, at the same time giving such remarks on the variation of form as may seem requisite, in order to make this beautiful class as intelligible as possible.

Although, from a careful examination, my inclination leads us to recognize, with Professor Forbes, but three Unios, and one Anodonta, yet other authors have been willing to admit several more, and a lengthened investigation may add one or two species to our Unionidœ, or it may reduce them to two Unios, and one Anodonta.

This group of bivalve shells represent our largest species of fresh-water mollusca. In this country it is but a small family with respect to different species, yet in America it constitutes a very varied one, and in the United States alone there are two hundred species.

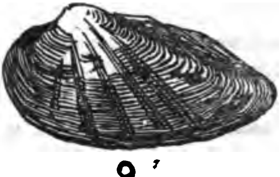
The Unionidœ are all equivalve. They are covered with a brilliant epidermis, which gives them a very shining appearance. The interior of their valves have a pearl-like surface. All of them are inhabitants of fresh water, crawling on the bottom, partly buried in the mud. The shells of the females are more ventricose than those of the males.

UNIO.

Very variable in form; frequently of great strength; the ligament external, and having primary teeth on the hinge.

UNIO TUMIDUS (The Tumid Union). *Retzius.*

Figure 9.



9.

The valves of this Unio are somewhat of an oblong-ovate shape, being unequally ventricose, and the umbones swollen and wrinkled. The colour of the shining epidermis is in some degree olive, interspersed with transverse greenish rays, which converge to a point towards the umbones. Sometimes the shell is entirely free of these transverse markings, and other specimens are of a uniform pale brown colour. The ligament is large, shining, and projects. The inside of the valves is mostly of a blueish-white colour; occasionally specimens are found which are salmon-coloured, but they are of rare occurrence, excepting in the canal near Beeston, where the proportion is two in five. The primary teeth have much strength and are slightly compressed; the hinder teeth on the left valve are upright, being almost perpendicular.

In speaking of a fine specimen, Professor Forbes remarks, it measures 3 inches in length, and rather more than 1½ inches in breadth in the widest part. Larger specimens have been taken from the river Trent, near Beeston. One I have lately obtained is rather more than 3¼ inches long, by slightly more than 1¾ inches broad.

Unio tumidus is more solid than Unio pictorum, and is furnished with larger and stronger anterior teeth. The shell tapers behind, and is broader than Unio pictorum.

It inhabits slow rivers and canals, and appears to grow more vigorously in the former than in the latter localities.

It may be considered, in this neighbourhood, to be an abundant shell, in the localities where it is found, and these are, the river Soar at Thrumpton, the river Trent from Sawley to Beeston, and the canal at Beeston.

More distant recorded localities are, the New River, the river Avon, the river Kennet, and the river Ouse (Forbes and Hanley), Ely River, Cardiff (Jeffreys), near London (Grey), Newcastle (Alder), Germany

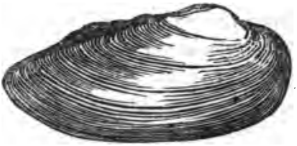
(Pfeiffer), Sweden (Nilson), France and Belgium (Forbes).

As a fossil it is found in the tertiaries, contemporaneously with the drift when the British Isles were under the sea (Forbes).

The variety of some authors, called Unio ovalis (or the Oval Union), is thick, and assumes a yellowish green colour. Hereabouts it is found associated with Unio tumidus, from which it scarcely differs.

UNIO PICTORUM (The Painter's Union). *Linnæus.*

Figure 10.



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The form of Unio pictorum varies much more than that of Unio tumidus, being chiefly from an elongated oval-oblong to a somewhat produced oval, and at times being very much produced. The umbones are compressed. The epidermis, which is brilliant, is of an olive-yellow, changing posteriorly into an almost green colour. The two sides of the shell (by which we mean the upper and lower edges) are nearly horizontal. There is an elongated projecting ligament. The primary teeth are coarsely crenated and flattened; the hinder teeth scarcely to be recognized. In recording a fine specimen, Professor Forbes gives the following dimensions:—Length, 3 inches; breadth, nearly 2¼ inches. The largest specimen taken in this neighbourhood is in length 3¾ inches, and in breadth 2⅛ inches. Sir Oswald Moseley has sent me a specimen, procured from his lake at Rolleston Hall, which measures 4 inches and one-tenth long, and 1¾ inches broad. It is thought advisable to give the dimensions of two fine adult specimens, as dredged in the river Trent, in order to illustrate the great diversity of form in this species. The one measured inches and three-eighths long, by only 1¼ broad; whilst the other measured 3 inches long, by 1½ inches broad.

The internal colour of the shell is mostly of a silvery-white, although it is not unfrequently salmon-coloured. The interior of the shell is very pearl-like in appearance.

The immediate localities of Unio pictorum are the following:—The river Trent; the river Soar, about Thrumpton Park; the lake at Highfield House (where it is very large); a sheet of water at Wollaton; and the canal near Beeston.

Other localities are, the rivers Kennet, Avon, Ouse, Aire, Don, and Severn, and the canals in the neighbourhood of London, Hull, and Birmingham (Forbes), in Chillington Pool (Jeffreys), in the lake near Rolleston Hall, near Burton (Sir Oswald Moseley), the Shrewsbury Canal and near Eyton (Eyton), Scarborough (Bean), ponds at Wynyard (Sir W. C. Trevelyan, Bart.), the river Brothay, near Ambleside (Brown), near London (Grey), Birmingham and Wiltshire (Montagu).

Abroad, it is found in Germany (Pfeiffer), Sweden (Nilson), and from Sweden to Naples (Forbes).

As a fossil it is found in the tertiary formation, at the time of the drift, at which period the greater portion of Great Britain was covered by the sea (Forbes).

The varieties of *some authors* to be found in this neighbourhood are :—

Unio rostrata, dredged in the river Trent near Beeston, and in the lake at Highfield House.

Unio Deshaysii, procured in the river Trent near Beeston.

Unio.—*Dubious.*

The following description is from two specimens only, dredged from the river Trent, near Clifton Deeps. Should others be found, there will be little doubt but that it will prove a different species. However, as I describe them from two solitary examples, and as the Unios are so very various in form, it is requisite to be cautious ere I pronounce them a distinct species. Certainly they are very curious specimens, partaking a mid-way character between Unio pictorum and Unio margaritiferus. The form is that of an elongated oval. The ligament is narrow, long, and rises. The beaks are eroded, as in Unio margaritiferus, displaying the olive-coloured nacre of the umbones, excepting round the edges, where it is pearly-white. The umbones do not rise above the shell. There are twin teeth on the left valve, very solid, and erect, and a broad erect tooth on the right valve; these teeth bear a very striking resemblance to those of Unio margariliferus. Besides these there are lateral teeth resembling Unio pictorum, but not so much elevated, which Unio margaritiferus does not possess. The colour of the shell is of a greenish-brown, with very faint, almost imperceptibly faint, transverse rays, which converge towards the umbones. The interior of the valves is a bronze colour very similar to that of Unio margaritiferus. The length of the shell is two inches, the breadth one inch and one-eighth, and its width, in the most ventricose part, half an inch.

The form of the shell is nearly intermediate between Unio pictorum and Unio margaritiferus.

In all probability other similar specimens will be found in the same locality, and, in this case, a drawing and further description will be given at the conclusion of the work.

ANODONTA.

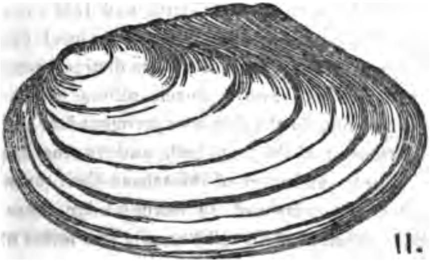
This very interesting branch of the family have usually a much thinner and more fragile shell than the Unios. The shell is equivalve, the ligament is external, and the hinge contains no teeth.

The form of the Anodonta must be looked upon as the most varied of the British mollusca, and in size also it differs very considerably.

Professor Forbes remarks, in his new work, that in spring and summer the branchial leaflets of the female are filled with minute yet complete shelled young ones, to the number of many thousands.

ANODONTA CYGNEA (Swan Fresh-water Muscle).
Linnæus.

Figure 11.



The above shell attains a size which is considerably larger than any other British fresh-water shell. Local causes, however, affect its dimensions and form very considerably. In a cold stream near Chaigeley, in Lancashire, it does not exceed two inches in length; whilst in a sheet of water at Hartwell, in Buckinghamshire, it attains a size which is above six and a half inches.

Amongst other causes which influence the form and growth of the Anodonta may be enumerated, the deepness, the purity, temperature, or rapidity of the water in which it happens to be an inhabitant.

The general form of our fresh-water muscle is that of an elongated oval, being more or less ventricose. The epidermis has a glossy appearance, and is somewhat of a yellow tint, being slightly tinged with green. The colour of the inner surface of the valves is usually silvery, but occasionally pink, and, in rare cases, of a somewhat bronze colour.

This shell inhabits slow rivers, canals, pools, streams, and lakes.

There are not only many varieties of form of the Anodonta cygnea, but each variety sustains its character under similar circumstances. Upon a careful examination of many specimens, I find no reason to differ from the opinion of Professor Forbes, that we possess but one Anodonta in Great Britain, and that the great diversity of shape is to be attributed to local causes; for if we take two apparently quite distinct species of this shell, we can find a dozen others which will gradually assume in the first six specimens less and less of the character of the first shell, and in the last six gradually more and more of the second shell, by which means we are compelled to acknowledge these two seemingly different shells to be merely two forms of the same mollusc.

The principal localities in this neighbourhood are—a mill dam at Bulwell, and a stream near it, the lake at Highfield House, the canal near Beeston and at Lenton, the river Trent, the river Soar, a backwater called "The Old Trent" near Sawley, a sheet of water at Radford Grove, another at Cinder-hill, and a third at Basford.

The more distant localities are too numerous to enumerate.

According to Professor Forbes, a large specimen is 6 inches long, and 3 broad. Some obtained from the lake at Highfield House were larger than this, and specimens from a sheet of water in the park at Hartwell (the seat of Dr. Lee) measured 6⅜ inches long, by 3¼ inches broad.

As the form of this shell varies very considerably, brief descriptions of some of them will be given.

Specimens taken from a sheet of water in Hartwell Park were 6⅜ inches long by 3¼ inches broad, and 2⅛ inches across in the most ventricose part. They were strongly indented with brownish longitudinal markings on the lower half of the valves, some of the deepest indents being nearly the eighth of an inch in depth; the upper half of the valves were very little indented, and of a yellowish green colour. The ligament scarcely raised above the shell, and nearly black, as also was the colour of the upper part from the ligament to the fron edge. The longitudinal marking was less shown in the interior of the valves, though very apparent. The upper edge of the valves was almost straight. The colour of the interior of the valves a pearly-white. The shell fragile.

Specimens found at Dinton, in Buckinghamshire, by the Rev. J. Goodall, and sent to me by Dr. Lee, were not nearly so much produced as those taken at Hartwell. The length was 5¾ inches, the breadth 3 inches, and the ventricoseness 1⅞ inches. The colour a dull brownish-green, being rather pink on the umbones. The ligament raised. Strong lateral markings, which which were mostly raised above the shell, instead of, as in the Hartwell specimens, indented. The umbones were also much broader. The colour of the inside of the valves was a blueish-white. Shell strong and thick.

Mr. Gough, of Kendal, sent me specimens from the canal at Kendal, in which the ligament rises at a tolerable angle, and at its extremity the valves fall at an angle of 45° in a straight line for two inches in length. Umbones very thin. Lower half of the shell yellowish-green; upper part a decided green, being mottled with brown in places. Inside of the valves white. Length 5½ inches, breadth 3 inches, and width in most ventricose part 1⅝ inches.

Others sent by Mr. Gough, from ditches on a peat bog called Brigstar Moss, near Morcamb Bay, were much more ventricose, with broad umbones, and the colour a darker green.

Several specimens found in the river Trent, near Beeston, were nearly 3 inches long, by 1⅝ inches broad, as measured at the end of the ligament, and only 1¼ inches at the umbones. The ligament rises at an angle of 20°.

The large Anodonta taken from the lake at Highfield House, have the upper and lower edges of the valves nearly parallel, with very narrow umbones. The ligament rises. The lower half of the shell is pale green, with strong lateral markings; the upper half is a brownish-green. Interior of the valves a pearly-white. The specimen measured was 5¾ inches long, by 3 inches broad, and 1⅞ inches wide in the widest part. Larger ones have been dredged from this lake.

Another specimen from the same lake has the lower edges of the valves circular. Ligament also rather circular. Colour a light green, with faint converging rays from the umbones of a lighter hue. From the umbones, across each valve, is a broad red band. The interior of the valves is of a bronze colour, and especially so near the umbones. Length 4⅞ inches, breadth 2⅞ inches.

A very ventricose variety is found in the same lake, whose form is nearly oval. Its length two inches and three-sixteenths, breadth one inch and five-sixteenths, and nearly an inch in width in the most ventricose part.

A specimen which I obtained from Mr. Tennant, of the Strand, London, was of a pale green colour, with very dark green converging rays from the umbones. The ligament very narrow. From the front of the ligament the valves have a rapid bend.

Some very curious specimens were shown to me by Professor Forbes, in the Museum of Practical Geology. They were almost oval, and bore less of the character of the Anodonta than any others which I have examined.

Some large and handsome specimens have been sent to me by Mr. T. Bailey, of Basford, from a sheet of water in his own grounds. The lower half of the valves are of a *yellowish-green* colour, whilst the other half are a *decided green*. The size is 5¾ inches long, by 3⅛ inches broad in the broadest part (which is at the summit of the ligament); behind the umbones the breadth is a quarter of an inch less. In ventricosity an inch and three quarters.

Very large specimens are obtained from the Lancaster Canal (Winstanley).

The varieties of some authors, found in this neighbourhood, are:—

Anodonta cygnea var. Anatina, in the lake at Highfield House, a brook at Lenton, the river Trent and the river Soar.

Anodonta cygnea var. Avonensis, the river Trent, near Beeston.

Anodonta cygnea var. Contorta, in the lake at Highfield House.

Anodonta cygnea var. Ventricosa, in the lake at Highfield House.

With regard to the distribution of this shell throughout England, Scotland, and Ireland, it seems everywhere to be abundant. It has also a range all over Europe. Water fowl appear to feed upon it.

As a fossil, we find it with Unio tumidus and Unio pictorum, in the fresh-water tertiaries, at about the period of the drift (Forbes).

In the family Unionidæ we are deficient of one member, the Unio margaritiferus (of Linnæus), which is an inhabitant of rapid streams in mountainous districts.

ADDENDA TO THE BIVALVE SHELLS.

It will perhaps be interesting, as we proceed, to say when each shell was first discovered, or added to our British conchological catalogue. The following are the various dates of the first descriptions of the bivalves, and by whom described :—

Cyclas rivicola, described by Dr. Lister, in 1678.

Cyclas cornea, described by Dr. Lister, in 1678.

Cyclas caliculata, added by Montagu, in 1803, in his "*British Testacea.*"

Pisidium amnicum, described by Dr. Maton and the

the Rev. Mr. Racket, in 1797, in the "*Linnean Transactions.*"

Pisidium cinereum, added by Mr. Alder, in 1838, in his supplement of the "*Newcastle Shells.*"

Pisidium Henslowianum, added by the Rev. Mr. Sheppard, in 1825, in his list of "*Suffolk Shells.*"

Pisidium nitidum, described by Mr. Jenyns, in 1832, in his "*Monograph on Cyclas and Pisidium.*"

Pisidium obtusale, added by Captain Brown, in 1831, and described in the "*Edinburgh Journal of Geographical Science.*"

Pisidium pulchellum, added by Captain Brown, in 1831, and described with P. obtusale.

Pisidium pusillum, described by Dr. Turton, in 1822.

Dreissena polymorpha, added by Mr. J. de C. Sowerby, in 1824.

Unio tumidus, described by Dr. Lister, in 1678.

Unio pictorum, described by Dr. Lister, in 1678.

Anodonta cygnea, described by Merret, in 1667.

Mr. Grey states that Pisidium cinereum, P. Henslowianum, P. nitidum, and P. pulchellum, are not found in France or Germany, and that Unio pictorum and U. tumidus does not exist as far north as Scotland.

We have now completed the history of our bivalve shells, a history which is almost complete for Great Britain, inasmuch as this locality contains fourteen out of the fifteen British bivalves; the deficient species being one which belongs to the family of Unionidæ.

NERITIDÆ.

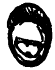
The curious family of Neritidæ is almost exclusively a tropical fresh-water, or marine shell. England, however, possesses one solitary branch, the Neritina fluviatilis. The shell is of considerable thickness and strength, and is the most solid of all the British mollusca. The animal is possessed of an operculum.

NERITINA FLUVIATILIS (The River Neritine) *Linnæus*.

Figures 12 and 13.

12.

13.



Generally an inhabitant of slow rivers, but occasionally, although not frequently, to be found in lakes and canals.

The River Neritine is to be met with adhering to stones, and less frequently to other shells, more especially to the valves of dead ones, yet sometimes to those of living mollusca. I have found them on live specimens of Dreissena polymorpha and Paludina vivipora, and on valves of dead Anodonta cygnea and Unio pictorum.

This species is gregarious, stones being discovered completely covered over with them. In winter they abandon these stones, and in all probability lie dormant, with closed opercula, in the mud or gravel at the bottom of the water.

Neritina fluviatilis is rather a difficult shell to describe in plain terms, the illustrations giving a much clearer idea than any lengthened description; it has therefore been considered more advisable to refer the reader to *figures* 12 *and* 13, confining the delineation to a few remarks only as to its form.

Neritina fluviatilis is a fresh-water species.

The shell is univalve. The spire possesses but a few whorls, the last convolution being exceedingly large in comparison to the others. The colour is variable, some specimens being *nearly black*, whilst others are *red*; this colouring is scattered over with elongated *cream-white* spots. The specimens from the Lenton Canal are green, with nearly black markings.

Locality seems to have great influence on the colour of a shell. It has invariably been noticed that the specimens taken from the river Trent are much darker than those obtained elsewhere in this neighbourhood, probably owing to the depth, and more especially to the rapidity of the stream. This remark applies equally to other species besides Neritina fluviatilis, for Unio tumidus, Unio pictorum, Anodonta cygnea, Bithinia tentaculata, and Cyclas rivicola procured in the river Trent are all much darker than in any other locality in the vicinity of Nottingham. This difference in colour is strikingly shown when specimens taken from the Beeston Canal, near its junction with the river Trent, are examined with the Trent shells, although within a few yards of the same spot, and it is even more strikingly seen from a comparison of shells procured from the Trent near the mouth of the Soar with those taken a few hundred yards higher up the Soar.

In Neritina fluviatilis the aperture is obliquely semi-oval, the interior being tinged with *blueish-white*, and having a polished appearance. The colour of the operculum is somewhat of an *orange-yellow*, having a narrow *orange-scarlet* band running round it, at nearly the edge of the operculum.

The dimensions of large specimens obtained from he Trent, near Beeston Ryelands, and from the canal near the Wollaton Park wall, are—in length five-twelfths of an inch, and in breadth three and a half twelfths of an inch.

In the month of September, the large stones which are under water in the Trent are covered over with the young Neritina fluviatilis. At first they seem like so many cheese-mites dispersed over the stones, apparently immovable, and glued to the respective spots which they occupy. They are of a yellowish-white colour, and, when rather more advanced, change to brown with faintly-perceptible yellow markings. On attaining about double the size of a cheese-mite they move about. At this period, excepting being very fragile, they have a similar character to the parent shell. Stones which were buried about ten or twelve inches under water were most crowded with the young of Neritina fluviatilis; however, others dredged from a depth of ten feet contained many specimens.

Neritina fluviatilis was first described by Dr. Lister, in 1678.

This shell frequently has a calcereous incrustation deposited by the water over the external surface, and this covering gives the appearance of pieces of dirt, by which means these mollusca frequently escape being attacked by fish and water fowl, who mistake them for dirt.

The Neritina fluviatilis may be classed amongst our very local shells, being everywhere confined to certain limits. The localities in this part of the county are, the river Trent, near Beeston Ryelands (where it is quite abundant); the river Soar, at Thrumpton; the canal near Beeston (in which it is rare, and may have been carried into it from the Trent); and the canal between Lenton and Radford. Mr. Winstanley has also dredged it from the Trent, below the bridge at Nottingham.

Other localities are, Bristol and Wiltshire (Montagu), the river Thames (Grey), the rivers Ouse and Humber, with their tributaries (Forbes), the rivers Severn and Avon (Forbes), Surrey (Millett), near Scarborough, although rare (Bean), Swansea (Forbes), the rivers Bela and Lune (Gough), the Lune at Skerton Bridge, near Lancaster (Howitt), and in Blenheim Lake (Mrs. R. Smith). In Ireland, in the rivers Liffey, Shannon, and Lee (Thompson), Dublin (Brown). In Scotland it is doubtful whether it is to be found as an inhabitant, although, strange to say, it is described by Professor Forbes as being found in the Loch of Stennis, in the Orkney Islands.

Abroad, it is an inhabitant of the Baltic Sea (Forbes), Germany (Pfeiffer), Sweden (Nilson), generally distributed through central, and in parts of northern and southern Europe (Forbes).

Professor Forbes informs us that, as a fossil, it occurs in the fresh-water deposits of the oolitic period.

The shell soon dies when kept in confinement.

PALUDINIDŒ.

A small family of univalve fresh-water mollusca, embracing the divisions of Paludina, Bithinia, and Valvata, each of which is furnished with an operculum, formed for the most part of *concentric-laminœ*, extended around a nucleus which is not always situated in the centre of the operculum.

PALUDINA.

This branch of the family of Paludinidœ take the name of Paludinœ from frequenting ditches and marshes.

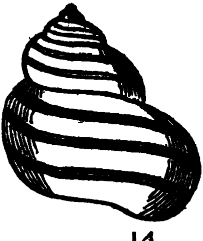
The shell is turbinated, or twisted, and has a produced spire; the convolutions are generally rounded. The aperture is more or less oval, the operculum horny, and the epidermis is coloured.

It is bisexual, and also ovo-viviporous, bringing forth its young alive, and in perfectly-formed shells.

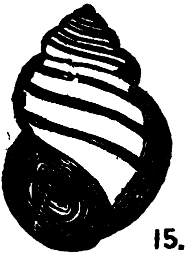
M. Bouchard Chantereaux informs us, from his investigations, that, in autumn, the females contain each twenty or thirty eggs, and that the young ones are brought forth when they are little more than two months old.

Paludina vivipara (Common Marsh Shell). *Linnæus.*

Figures 14 and 15.



14.



15.

The present interesting shell in general form and size approaches more closely to the garden snail-shell than any other of the aquatic species. The umbilicus is more or less concealed, and not unfrequently entirely hidden, by the overlapping of the outer whorl.

The shape of Paludina vivipara is very produced, having six convolutions, the last of which is almost obsolete. The colour is that of an olive-green, over which are broad reddish-brown bands; these bands are so placed as to have three of them on the lowest whorl, the bottom one of which becomes obsolete at the commencement of the second whorl; the other two bands traverse the second and third whorls, and then gradually fade away.

The dimensions of the largest specimens procured from the river Soar, near Thrumpton, and the canal near Beeston Ryelands, are—the length, an inch and a half; the breadth, one inch and one-sixth of an inch; the latter being the diameter of the lowest whorl.

It grows to a much larger size in the south-eastern parts of Germany than it does in England.

Dr. Lister appears to have been the first conchologist who described this shell, in a work which he published in the year 1678.

The young, as extracted from the parent before the period at which they are brought forth, have very thin transparent shells, and are nearly spherical. If the oviducts of Paludina vivapara are examined at the commencement of summer, they will be found to contain young from a quarter of an inch in diameter downwards to a size which is nearly invisible to the unassisted eye. Mr. Woodward, of the British Museum, says, "Embryos scarcely visible to the naked eye have a well-formed shell, ornamented with epidermal fringes; a foot and operculum; and the head has long delicate tentacula, and very distinct black eyes." The young are not born until they are about a quarter of an inch in diameter.

I have also alluded to this shell in my introduction, at page 3.

An inhabitant of slow rivers, canals, and ditches, flourishing best where the water is still and not liable to be frequently disturbed by strong currents.

It is very readily kept in confinement, in any small vessel which contains water. The year before last I myself kept one in this manner throughout the winter, giving it occasionally fresh water; under these circumstances it flourished and increased its size considerably.

A curious fact with respect to this shell, as well as to many others (especially Bithinia tentaculata, Cyclas cornea, Planorbis cornea, Planorbis marginata, Planorbis carinatus, Valvata piscinalis, Limnæus pereger, &c.,) is worth recording. In cold weather these molluscs require a much greater degree of heat to destroy them than in hot weather, a circumstance probably accounted for by their animal heat being greater in cold than in hot weather, and also probably by their being somewhat torpid at a lower temperature. This phenomenon is so apparent that it requires a temperature about 20° higher to kill them in autumn to what it does in the middle of the summer. Physa fontinalis, Planorbis albus, and Neritina fluviatilis are an exception to the rule, as a similar temperature will destroy them at all seasons of the year. Amongst the land shells several of the Helices also require an increase of heat for an increase of cold in the weather to destroy life.

Our localities for Paludina vivipara are, the river Soar at Thrumpton and the canal near Beeston, in both of which places it is abundant. Also the Trent, at Beeston Ryelands, and below the Nottingham bridge, and the canal and a ditch at Lenton.

It is found in the Thames (Forbes), at Birmingham

(Brown), Surrey (Millett), London (Grey), and Essex (Sheppard).

It is rather singular that this shell has not been discovered in Ireland, and, according to Mr. Grey, it is not found in the north of England, and I believe it is not an inhabitant of Scotland.

In central Europe generally (Forbes), Germany (Pfeiffer), Sicily (Philippi), and in Sweden (Grey).

Found fossil as far back in time as the oolitic period.

We are deficient of a very similar-looking shell, a branch of this family, the Paludina Listeri of *Forbes and Hanley*. It is recorded as being found in the Trent in "The History of British Mollusca," but, as I have not met with it, probably the locality may be a considerable distance from Nottingham, and, in which case, of course cannot be included amongst our shells. The chief distinctive difference of Paludina Listeri from Paludina vivipara are, deeper volutions, a white keel, and an open or well-seen operculum. These characteristics are very striking when comparison is made with Paludina vivipara.

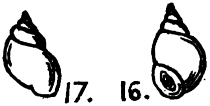
BITHINIA.

This is a twisted or spiral shell, much produced in its form, but varying in shape from that of a more ventricose and stunted form to that of a greater length with little or no increase in ventricosity. The convolutions are very rounded, and possessing a somewhat horny epidermis. The aperture is nearly egg-shaped, excepting on the upper side, where it is rather angular. The internal rib around the aperture is thickened.

These animals are oviparous, a number being deposited in an oblong group on aquatic plants.

Bithinia tentaculata (The Tentacled Bithinia).

Figures 16 and 17.



The Tentacled Bithinia has been known for so many years, that it would be difficult to say by whom it was first discovered.

It is a rather slender, semi-transparent shell, being very smooth. The general colour is that of a *yellowish-horn*, not unfrequently it is entirely incrusted with a *brownish-black* coat. There are five convolutions, the lowest one being nearly as large as the whole of the other four convolutions together. It is somewhat ventricose, but varies; occasionally shells are found much more produced, without any increase in their ventricosity. It also varies much in the size it attains, in some localities being almost twice as large as in others. It has been noticed that where it attains the greatest dimensions it is the least abundant. Bithinia tentaculata is without an umbilicus. The last, or uppermost whorl, ends in a point.

M. Bouchard Chantereaux informs us that the Bithinia tentaculata lays its eggs from the month of May to that of August. It usually deposits from thirty to seventy in number at one time, which are yellowish hyaline eggs, and are united together in a band, being fastened firmly to aquatic plants or stones. The young ones are hatched in from twenty to twenty-five days after the eggs have been deposited, and two year elapse before they become fully grown.

It seems to thrive in confinement.

The usual length is half an inch, and the breadth four lines, as measured in the broadest part. Specimens procured from the Musco-sic dyke, near Beeston, measure seven-twelfths of an inch in length, and four-twelfths of an inch in breadth on the lowest whorl.

An inhabitant of ditches, brooks, canals, and rivers; mostly found clinging to aquatic plants, and seeming to prefer those places most overrun with aquatic vegetation, and consequently being more or less stagnant.

The localities in the neighbourhood of Nottingham are very numerous, the principal ones are, an almost stagnant ditch close to the canal near the Priory at Lenton (where it occurs in such vast numbers that it is surprising they have room to live and move about, for stones in the water may be found covered six, eight, or ten deep); a clear dyke at Beeston; the Trent at Beeston, Attenborough, and Sawley (amongst algæ on the water's edge); clear dykes at Chilwell and Atten borough; the Musco-sic dyke near Beeston (where it grows to a large size, and is more than ordinarily produced in its form); the river Leen at Bulwell; a small stream at Radford Grove; and in dykes in the Nottingham Meadows.

It is a common shell throughout England, but becoming less abundant in the more northerly counties, The following are a few (of the hundreds) of the more distant localities:—Near London (Grey), Kent and Dorsetshire (Montagu), Bristol and Wiltshire (Miller), Essex (Sheppard), Suffolk (Paget), Norfolk (Bloxham), Newcastle (Alder), Darlington near Durham (Graham), Kendal (Gough).

In Ireland, near Dublin (Brown); generally distributed throughout the island (Thompson).

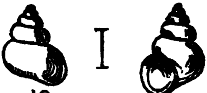
I am not aware that it is found in Scotland.

Professor Forbes says that it is generally distributed throughout Europe. It is described amongst the German shells by Pfeiffer, amongst the Swedish ones by Nilson, as an inhabitant of Sicily by Philippi, and of France by Grey.

It first occurs as a fossil in the mammalliferous crag (Forbes).

BITHINIA LEACHII (Dr. Leach's Bithinia). *Sheppard.*

Figures 18 and 19.



18. 19.

Bithinia Leachii was added to our list of fresh water shells by Mr. J. E. Grey, of the British Museum, in the year 1821, under the name of Bithinia ventricosa; this latter name it has usually borne, until Professor Forbes changed it, with good reasons, to B. Leachii.

This shell is thin, semi-transparent, and spiral, being very ventricose. It is horn-coloured. There are four or five convolutions, which are swollen, and deeply divided. The mouth is wide and nearly round, or approaching that of an oval. It has a small umbilicus. The usual size is 3 lines long, by 2¼ lines broad.

Bithinia Leachii may be looked upon as a somewhat rare shell, being almost confined to the south of England; it occurs here, however, in one or two places, but not very abundantly.

It inhabits lakes, rivers, canals, and ditches, mostly on aquatic plants; it can also live under the influence of a tide, where the water is brackish, as it is found in the Greenwich Marshes, associated with Assiminia Greyana; the latter is a shell which is only to be procured in brackish rivers in the south of England.

It lays about a dozen eggs, which it attaches to the stems of submerged leaves of aquatic plants.

Our localities are, a small ditch between the canal and main line of railway at Lenton, where it is abundant, but only spread over the space of about 20 yards; under the Seven Arches in the Nottingham Meadows, tolerably abundant; and, rare, in a ditch near the Trent, between Beeston and Attenborough. Mr. Jeffreys, of Swansea, has also found it in Clumber Lake.

Other localities are, Penzance, Cornwall (Millett), near London (Grey), Devonshire (Montagu), South Wales (Jeffreys), Essex (Sheppard), Preston (Kenyon), Bath (Clark), many tributaries of the Thames (Forbes), Cardiff (Jeffreys), Scarborough [rare] (Bean), Surrey (Millett), Battersea (Brown), and Suffolk (Grey).

In France, it is found at Tarles (M. N. Boubée).

I believe it has not been discovered in Ireland or Scotland.

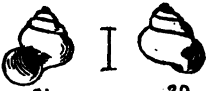
As a fossil it ranges as far back as the oolitic period (Forbes).

VALVATA.

These shells are conical, twisted, and rather fragile. The convolutions are smooth and very rounded, and they are umbilicated. They have a circular aperture, with a continuous peristome, and the aperture protected by a horny operculum

VALVATA PISCINALIS (The Stream Valve Shell). *Müller.*

Figures 20 and 21.



This abundant fresh-water shell assumes two very distinct forms, so different in appearance from each other that formerly they used to be recorded under two different names. The more stunted form of which was the *Valvata depressa* of Pfeiffer. From an examination of many specimens, Nilson Grey, and Forbes have each declared the V. depressa to be nothing more than a variation in the shape of Valvata piscinalis. In the one form the convolutions are produced and the umbilicus comparatively small, while in the other the convolutions are depressed, and having a large umbilicus.

There are five convolutions, which are somewhat polished, and rather pellucid. The operculum is deep, and tolerably large, and the convolutions are very rounded, the apex being small, but very blunt. The aperture is round and large. It is pale horn-coloured. The size is rather less than a quarter of an inch in diameter, and about a quarter of an inch in height.

In one locality in this neighbourhood (the Musco-sic dyke) the shells are mostly covered over with patches of a calcareous deposit, which gives them a mottled appearance. I have not found this deposit on specimens taken from any other water besides this brook, and even here only over a space of fifty yards.

Valvata piscinalis was first described by Petiver. in his "*Gazophylacium*," under the name of *Valvata obtusa*.

M. Bouchard Chautereaux describes this shell as laying, between the months of May and August, from

60 to 80 eggs, which are glued to stones or aquatic plants.

It is an inhabitant of canals, ponds, brooks, rivers, and ditches, preferring, according to Professor Forbes, *peaty* situations.

Our localities are:—A brook at Lenton, another near Beeston Railway Station, the Musco-sic dyke (throughout the greater part of its length), the Trent at Beeston, the river Leen at Bulwell, and a sheet of water at Radford Grove. In all these localities it is abundant, with the exception of the *Trent*. That variety of this shell which has been called *V. depressa* has been noticed sparingly amongst others in our localities, and Mr. Jefferies, of Swansea, records Clumber Lake as another.

Professor Forbes says the variety, *V. depressa*, is abundant in the curraghs of the Isle of Man, and Mr. Humphreys near Dublin.

Valvata piscinalis, although a common shell, and generally distributed throughout Great Britain, is rather rare in some localities. Amongst the many recorded places where it is found may be enumerated—the canal at Kendal (Gough), the Brigsteer Moss, in Westmoreland (Gough), Lancashire (Kenyon), near London (Grey), Kent and Dorset (Montagu), Bristol and Wiltshire (Miller), Essex (Sheppard), Suffolk (Paget), Norfolk (Bloxam), Newcastle (Alder), and Darlington, near Durham (Graham). In Ireland, it is found around Dublin (Brown), King's County (Brown), and Finnoe, county Tipperary (Waller).

On the Continent, it is an inhabitant of the greater part of Europe (Forbes), of Germany (Pfeiffer), of Sweden (Nilson), of France (Grey), and of Sicily (Phillippi).

As a fossil it is found in the later fresh-water tertiaries (Forbes).

VALVATA CRISTATA (The Crested Valve Shell). *Müller.*

Figures 22, 23, and 24.

22.

23.

24.

This minute shell was first described by Boys, in the year 1784, in "*Walker's Minute Shells.*"

Valvata cristata varies in its form, chiefly in the looseness of its coil, and in the upper side of the shell; this is mostly flat, but occasionally it is rather convex. In some specimens sent to me by Mr. Jeffreys, of Swansea, they are decidedly convex, whilst in others, obtained from the Bulwell bogs, they are slightly concave. The general form of the shell is discoidal, flat above, having the spire rather sunken, and possessing a deep and large umbilicus, in which all the whorls are seen. It is fragile, semi-transparent, shining, and has three whorls. The diameter of this shell averages about a tenth of an inch.

It is frequently covered with a black incrustation.

The *Crested Valve shell* is an inhabitant of ditches, canals, ponds, and lakes, mostly on aquatic vegetation.

The localities in this neighbourhood are—the bogs at Bulwell, where it is abundant; the river Leen at Bulwell, although not plentiful; an almost stagnant brook near the Trent, between Beeston and Attenborough, where it is rare; tolerably abundant in a small stream at Radford Grove; and sparingly in a muddy dyke which runs below the village of Beeston.

Mr. Jeffreys, of Swansea, has also found it in Clumber Lake.

The more distant localities which may be mentioned are—Prestwic Car, in Northumberland (Alder), Newcastle, Northumberland (Alder), Brigsteer Moss, Westmoreland (Gough), Scarborough (Bean), Cardiff (Jeffreys), Bristol (Miller), Bath (Clark), near London (Grey), Kent and Dorsetshire (Montagu), Essex (Sheppard), Wiltshire (Montagu).

In Scotland, at Duddington, near Edinburgh (Forbes).

In Ireland, at Dublin (Brown), Clare (Humphreys) distributed throughout the island (Thompson and Brown).

On the Continent, it is an inhabitant of France (Drapernaud), Germany (Nilson), Leipsic (Müller), Sweden (Pfeiffer), and near Paris (Brard).

Mr. Morris describes it as being found fossil with mammalia at Grays, Erith, Copford, Sutton, and Ilford on the banks of the Thames, near London.

Before continuing the investigations of the water shells, the land slugs and the Helix family will be first described.

LIMACIDÆ.

The land slugs must be a well-known tribe, as they present themselves in great numbers in damp weather, and are exceedingly destructive, especially in the kitchen garden. They are long, and partly cylindrical, and fleshy to the feel. The true slugs are not possessed of a shell, yet they have a calcareous shield, or the rudiments of a shell, which is buried in the mantle of the animal; this mantle covers the anterior part of the slug, being that portion situated at the back of the head, and is a means of protecting the breathing cavity.

The slugs have all four retractile horns or tentacles, having in the upper ones a pair of eyes. A great exuberance of mucilaginous matter is secreted from their bodies.

The slugs live upon vegetables, yet, when hard-pressed for food, will devour dead earth-worms.

This particular branch of the British mollusca are, to all outward appearance, devoid of shells, yet, when the animals are dissected, a thin crustaceous shield is found deposited in the mantle of the slug.

ARION.

The shell is undeveloped, being an oblong mass of a granular calcareous, or horny substance, which is hid in the mantle of the animal.

The Arion tribe is provided with four horns, having eyes placed on the upper pair.

ARION EMPIRICORUM (The Common Arion.) *Férussac.*

This Arion varies considerably in its colour, being sometimes black, at others nearly white, yellow, and reddish brown. It is frequently brilliant and shining, and may be said to be a handsome species. The variety in colour does not appear to be occasioned either by the locality or the food eaten by this species, for these many varieties occur wherever Arion empiricorum is found.

It ranges, in its length, from 3 to 5 inches. The horns are all of an exceedingly dark blue colour, the lower pair moderately short, whilst the upper pair are long. The eggs are somewhat oblong, rather large, and thick-skinned. They are deposited in vast numbers at the end of summer, under stones and old wood.

The favourite resorts of this animal are woods, and moist shady situations.

It was first discovered to be a British slug by Dr. Lister, and published in his work on British shells, in 1678.

The Arions lay from seventy to one hundred eggs, according to M. Bouchard Chautereaux. These eggs are deposited between May and September. They are hatched in from twenty-six to forty days, and continue to grow until a year old.

In this neighbourhood it is found at Highfield House, Beeston, Thrumpton, Sawley, and Oxton.

Throughout Great Britain it is a common slug. It is generally distributed through Ireland (Thompson), Isle of Man (Forbes), France (Drapernaud), Norway, Italy, and Spain (Grey), Germany (Pfeiffer), Sweden (Nilson), and has a wide range throughout Europe (Forbes).

ARION HORTENSIS (The Garden Arion). *Ferussac.*

The Garden Arion was first noticed in England by Mr. Grey, and published in 1821, in the "*Medical Repository.*"

The animal is dark blue, having longitudinal stripes of a grey colour. It is generally from an inch to an inch and a half in length, and occasionally larger. It has an oblong mantle, with coarse granulations, having two pale longitudinal bands.

An abundant species, though not so common as Arion empiricorum, frequenting gardens, hedges, and woods.

The localities in this neighbourhood are Highfield House, and Beeston.

In the more distant places—found near London (Forbes), Newcastle (Alder), Kendal (Gough), Bath (Clarke), Bristol (Miller), Wiltshire (Montagu) and Norwich (Bridgman). In Ireland (Thompson). On the Continent, in Germany (Pfeiffer), Sweden (Nilson).

M. Bouchard Chautereaux informs us, that its eggs, for the first fortnight after they are laid, are phosphorescent.

ARION FLAVUS (The Yellow Arion). *Müller.*

This recently-discovered British species appears to be remarkably rare, but its habits are such as would prevent any but the diligent conchologist noticing it, therefore it may not be so uncommon as is usually supposed.

The tentacles and head, which are short, are of a pale leaden colour, the tentacles being semi-transparent. The sole of the foot orange-coloured, with a narrow dark mark in the centre. Respiratary orifice not quite on the margin of the right side of the disc. The shield a lengthened oval, being small, greyish orange, and having small granules, The back of the animal, which is rounded, has coarse longitudinal prominences, the colour a greenish straw, that portion behind the mucus pore dark orange. There is a circular indent in the body, immediately above the mucus gland. The mucus gland is triangular in form. The tail is tapering, and terminates acutely. Mucus, pale orange-coloured. Length rather more than an inch.

It appears to prefer heaps of decaying leaves, into which it penetrates; it is also found at the base of some ferns, fungi, lichens, and mosses.

It has the power of suspending itself by a mucus thread.

I quite agree with M. Bouchard Chatereaux in considering this very distinct from *Arion Empiricorum.*

Arion flavus deposits its eggs from September to December. They are oval and yellowish.

Not uncommon amongst damp dead leaves and the fungus *Nidularia striata* at Highfield House; on Oxton bogs, on the rhizoma of the fern *aspidium thelypteris;* at the roots of *Lastræa cristata* and at the base of the bog-moss *(Sphagnum obtusifolium)*; at Wollaton rare amongst the lichen *(Peltidea canina)* in shady damp woods. Elsewhere, Newcastle (rare, Alder)

We have therefore every representation of British Arions.

A single Irish species, Geomalacus maculosus, separates the Arion tribe from that of the Limax family. As yet the discovery of this slug has been confined to the county of Kerry.

LIMAX.

The animals of the Limax family very closely resemble the form of the Arion, being somewhat oblong: they do not, however, possess the gland on the extremity of the tail as in the Arion. The mantle is also possessed of circular striæ, whilst in the Arion it is granulated. The head has four horns, or tentacles, in the upper pair of which the eyes are placed.

The shell is rather oblong, thin, fragile, and crystalline; it is entirely embedded in the mantle of the animal, being covered with a brown epidermis, which spreads itself beyond the shell.

The Limax occasionally suspend themselves, like the spider, by a mucous thread, formed from the slimy secretions of their bodies.

This tribe are much more hardy than the Helix family, being frequently noticed, during the winter months, in an active state.

Mr. Morris has found them in a fossil state in the mammaliferous crag on the banks of the Thames, near London.

LIMAX AGRESTIS (The Milky Slug). *Müller.*

Figure 25.

25.

This very common slug, which was first discovered by Dr. Lister, in 1678, is perhaps the most destructive of all the molluscous animals; it is not content with eating the leaves of plants, as it devours the roots with an equal avidity. Formerly it was much sought after as a cure for consumption.

Limax agrestis is in colour sometimes a yellowish grey, at others reddish grey; it is indistinctly speckled with brown. The tentacles are short, and the keel is small, oblique, and carinated. It has a large mantle. The usual length of the animal is about an inch and a half, yet large specimens are as much as two inches long.

The shell is very minute, being only three lines in length, swollen and convex above. It is strong and thick. The colour a yellowish white. It is most prolific, breeding several times a year. The eggs are pellucid and round. M. Bouchard Chantereaux informs us he noticed two individuals which deposited three hundred and eighty eggs.

The mucus secretion is of a milky-white colour, and is discharged from the body copiously when the animal is irritated.

From M. Bouchard Chatereaux's investigations it is recorded that two specimens deposited, between April and the end of November, no less than 348 eggs, laying them at intervals, from 30 to 70 at a time. The young, as soon as hatched, increase very rapidly in size. The conchologist observed an individual specimen lay eggs when only 66 days old, although they do not arrive at their full size until about the ninety second day (or three months).

The localities in this neighbourhood are very numerous, being abundant everywhere, both in fields and gardens. It is known to the gardener as the white slug.

It is equally abundant throughout Great Britain. Common in Ireland in Queens County and County Galway (Clarke), Isle of Man (Forbes), Germany (Pfeiffer), France (Brard), and Sweden (Nilson).

LIMAX FLAVUS (The Yellow Slug). *Linnæus.*

Figure 26.

The Yellow Slug was discovered by Dr. Lister in the year 1678.

The colour of the animal is yellowish-green, marbled with brown, having darker bands on its sides. The shield is large, somewhat oval, rounded behind, and concentrically wrinkled. The tentacles are short, and have a blueish tinge, which is also continued on the neck of the animal. The back is rounded; the tail is broad, and the end carinated above. The foot is white, and the mucus without colour.

It is generally from three to four inches long, yet occasionally exceeds five inches.

The shell is very fragile; the colour nearly white; the length a third of an inch; and the shape somewhat oval.

The cellar slug, for this species is best known as the cellar slug, is an inhabitant of cellars, vaults, and other damp places. They congregate together.

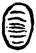
It has the power of suspending itself by a thread from a tree, or other elevated position to which it may have climbed, a property which several other of the Limax family possess.

In this neighbourhood it is found in cellars at Highfield House and Nottingham.

The more remote localities are:—Near London (Grey), Plymouth (Brown), Bristol (Montagu), Bath (Clarke), and Norwich (Bridgman). In Ireland—near Youghal (Ball), and in the north of that island (Thompson).

LIMAX ARBORUM (The Tree Slug). *Bouchard Chautereaux.*

Figure 27.



27

The Tree Slug appears to have been overlooked until described by the Rev. B. J. Clarke, having probably been mistaken for specimens of Limax cinereus not fully grown.

The colour of this animal is greyish, with dusky marbled lateral stripes, and having a pale band or streak extending along the back. The sole of the foot is white. The upper horns are small in proportion to the dimensions of the slug. The colour of the shield is yellowish grey, and having dark longitudinal bands. Large specimens are three inches long.

The shell is milky-white, varying much in thickness.

The eggs are oval, and are laid singly, either in the soil, or amongst rotten wood.

Limax arborum, when young, frequently descends from the branches of trees, like the spider, by means of mucus threads, instead of returning as they ascended.

It inhabits decaying wood and trees, feeding upon the wood.

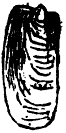
A remarkable provision of nature, possessed by the slugs and snails, is readily seen in this species, owing to the transparency of the superior tentacles. As with other of the Limaces, the eyes are placed at the ends of the upper pair of horns, on a tube which is situated in the centre of the tentacles, and extending to the mantle of the animal. If the end of either horn be touched, the eye will instantly recede down the tentacle, moving independently of it. By this all wise ordination these animals do not run so many risks of losing their sight as they would if constructed otherwise, for the tentacles are used as *feelers*, and when these touch any substance the eye is instantly withdrawn from the end, until such time as the animal becomes aware there is no danger of injury to the sight.

In this neighbourhood it is found sparingly at Thrumpton, and abundantly at Highfield House.

Other localities given by Professor Forbes in "*British Mollusca*" are:—Northumberland (Backhouse), near Liverpool (Byerly), Surrey (Forbes), in the Isle of Wight (Thompson). In Scotland—Aberdeen (Macgillivray), and in Islay (Thompson). In Ireland—near Cork (Forbes), common in the north (Thompson), and widely distributed through the island (Clarke).

LIMAX CINEREUS (The Spotted Slug). *Müller.*

Figure 28.



28.

The species we are now describing is the Limax maximus of Linneus and Grey, and as such is described by most of our British conchologists; Professor Forbes has, however, adopted the name (*L. cinereus*) used by Müller, Draperaud, Fleming, Bauchaud Chautereaux, Macgillivry, Nillson, and Blainville.

This slug which attracted the attention of the earlier naturalists was recorded by Merret, in 1667, in his *Pinax*, as L. maximus, and, although not so common as Limax agrestis, it is yet a very abundant mollusc; inhabiting damp situations, and being found in cellars, gardens, out-houses, and hedges; under decaying wood, and fragments of stones, &c.; coming forth from its retreat when invited by a copious dew, or shower of rain.

It does not appear to be so hardy as Limax agrestis.

Limax cinereus is much larger than any other branch of this interesting family, sometimes exceeding six inches in length. When closely examined it is a handsome slug.

The back of the animal is circular, excepting near the tail, where it is pointed. The tail is acute. The body is wrinkled longitudinally. The mantle is rounded in front, and of the form of a shield behind. It is mostly brown, or ash-coloured, spotted with black. The sole of the foot is yellow, The upper tentacles are of great length, while the lower ones are short. The mucus is colourless.

The shell, or calcareous shield, is oblong and fragile; the colour white, slightly stained with pink; and the size about six lines long, and from two and a half to three lines broad.

The eggs are cream-coloured, slightly ovate, and about two lines in length. They are deposited during the spring months, under stones, at the roots of grass, and at the trunks of trees, being attached together in heaps.

When the animal crawls, which it does slowly, it leaves a slime upon whatever it passes over.

Réaumur found this, and others of the Limax tribe, had insects on their bodies, which Gmelin has called *Acarus Limacum.*

This species is best known to those unacquainted with conchology as the black slug.

M. Bouchard Chatereaux says they lay from fifty to sixty eggs.

The localities in this neighbourhood are Highfield House, Bramcote, Beeston, Chilwell, Sawley, Thrumpton, Nottingham, &c.

It is generally dispersed throughout England; found in Scotland (Macgillivray), Ireland (Clarke), Isle of Man (Forbes), Germany (Pfeiffer), Sweden (Nilson), and France (Férussac).

The following species have not as yet been found here:—

Limax Brunneus. *(Draparnaud).*
Limax gagates. *Draparnaud).*
Limax tenellus. *(Müller).*
Limax Sowerbii. *(Ferussac).*

Of these Limax Brunneus is found in the north of England; Limax tenellus (which is very rare in Northumberland; Limax Sowerbii abundant about London and in Ireland; and Limax gagates chiefly in Ireland.

Testacella haliotoidea, a solitary species intermediate between the slugs and snails, and bearing a shell at the extremity of its back, is carniverous in its habits. It has not been found north of London.

HELICIDÆ.

This large family of British snails are furnished, for the most part, with spiral shells, which are, without an exception devoid of an operculum. However, instead of this appendage, the animal has the power of closing the aperture, during the cold weather of winter and the hot dry weather of summer, by a membranaceous or mucous covering, which is perforated with holes to enable the animal to breathe. The snails have four tentacles, in the upper pair of which, at the extremity, the eyes are situated.

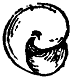
VITRINA.

Shell pellucid, fragile, thin, oblong, somewhat depressed, subglobular, and glossy in appearance. Aperture large, rounded, lunate, peristome, or margin of the outer lip, thin. Three rapidly increasing whorls.

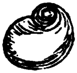
The animal is very large for the dimensions of the shell, elongate, lanceolate. Of the four tentacles, the inferior ones are short. The mantle is large, thick, and covers a portion of the shell.

VITRINA PELLUCIDA (The Transparent Glass Bubble Shell). *Müller*.

Figures 29 and 30.



29.



30.

The above solitary representative of this family in Great Britain was described by Pennant, in 1777, in his "British Zoology."

The animal appears to be more hardy then any other of the helicidæ, as it is found in greater abundance from October to December than in summer. Nilson observed it crawling about amongst leaves in the south of Sweden in the depth of winter.

It is greyish in colour, with much darker head and tentacles. The tentacles are short. The mantle of the animal is reflected on its shell. The tail is narrow, and much produced behind the shell.

The colour of the shell is watery-green, but varies in the depth of colour, some specimens being even pea-green. It is exceedingly thin and transparent, very glossy, smooth, and extremely fragile. The body whorl is large. There are three and a half whorls, which are much depressed, and the spire, which is blunt, is but little elevated above the last whorl. The form of the shell is elliptic, the aperture being large and nearly oval; the breadth somewhat greater than the length.

The eggs are oval, white, almost transparent, having an opaque spot in the centre. They are deposited in bundles of eight, ten, or more, together. M. Bouchard Chautereaux says they are deposited in September, October, and November, and that from eight to fifteen are laid at one time. They are hatched in from fifteen to twenty days, and the animals are full-grown in from eight to ten months. Nilson placed some of the animals in a glass bell towards the close of January, and on the 19th of February he found they had deposited eggs; about the 21st of March the animals were hatched; the animals and shells being perfectly formed as soon as exuded from the eggs.

Vitrina pellucida is found in woods and hedge bottoms, amongst moss, putrescent leaves, and under stones and decaying wood.

The localities in this neighbourhood are, the woods at Wollaton, Stanton on-the-Wolds, Oxton (both on the bogs and on the Warren, where it is extremely abundant), and at Highfield House.

The localities further removed are too abundant to describe, a few will suffice. Penzance, in Cornwall (Millett), Devonshire, Dorsetshire, and Kent (Montagu); Essex (Sheppard), Suffolk (Paget), Norfolk (Bloxam), London (Grey), Newcastle (Alder), Kendal (Gough), Calke Abbey, near Derby (Bloxam), at roots of spinosissima on Swansea Burrows (Jeffreys), and Norwich (Bridgman).

In Scotland (Laskey), near the summit of Arthur's Seat, Edinburgh (Brown).

In South Wales (Jeffreys).

In Ireland, widely spread (Brown), King's County (Brown), and in high mountainous districts (Thompson).

In the Isle of Man (Forbes). Scilly Isles (Millett).

On the Continent it is found in France (Draparnaud), Germany (Pfeiffer), and even to the north of Sweden (Nilson).

ZONITES.

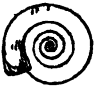
This is a division from that of Helix, adopted by Grey and some few other conchologists, and to some extent adopted by Forbes and Hanley in their "British Mollusca."

The shell is smooth, shining, fragile, spiral, and depressed, being more or less flat, and having many convolutions. The mouth is large, lunate, and without a thickening rim round the outer edge.

The animal is large, but can withdraw itself into the shell. The head is provided with four tentacles, the inferior ones being small.

ZONITES CELLARIUS (The Cellar Snail). *Müller.*

Figures 31 and 32.



31.

32.

It is the *Helix celaria* of Müller, Alder, Brown, Lamark, Pfeiffer, Rossmassler, &c.

This shell is shining, smooth, and pellucid; it is flat, of a pale yellowish-horn colour above, and on the under side, around the umbilicus, is milky-white. There are from five to five and a half convolutions. The size varies very much in this neighbourhood, the largest having been found in Mr. G. Allcock's cellar—the finest specimen measuring more than half an inch in diameter.

The habitat of Helix celaria is confined to damp situations, being most abundant in cellars, drains, and shady courts; it is also found in fields and woods, under stones and amongst grass.

It is singular that this species appears to flourish best and attain a larger size in a habitation devoid of light, and passing the whole of its existence in the dark.

In this neighbourhood it is found at Nottingham, and about Nottingham Castle, at Highfield House, and Stanton-on-the-Wolds.

A widely-spread species in Great Britain and Ireland, being equally abundant in Penzance (Millet), Hartwell House (Rev. C. Lowndes), near Stone (Rev. J. B. Reade), Chaigeley, Lancashire (Winstanley), the drains of Dublin, where it is very large (Warren), Harleston, Norfolk, and Calke Abbey, Derby (Bloxam), Preston (The Author), and Norwich (Bridgman).

Found in France (Férussac); in Sweden (Pfeiffer).

ZONITES ALLIARIUS (The Garlic Snail). *Miller*.

Figures 33 and 34.

33.

34.

Dsicovered by Mr. Miller, in the year 1822, and described in his "*List of Shells about Bristol.*"

Although a nearly flat shell, it is more convex than that of the cellar snail; it has only four convolutions, and the size is also considerably less than that species. It is fragile, pellucid, polished, and almost smooth. In colour it nearly resembles Zonites cellarius, being slightly more yellow. The umbilicus is somewhat large, and immediately around it the colour is opaque white. The opening of the shell differs from that of Zonites cellarius in being not so opaque.

The form of the animal bears a striking resemblance to the cellar snail, but the colour is different, being a blue black. The tentacles are small. The size of the shell is a quarter of an inch in diameter.

There are several varieties, one of which grows to a larger size, and the distinctive character of another is in the colour being a greenish tint.

The name "Garlic Snail," is applied to this species because some of them have a strong garlic scent when alive, whilst others, not possessing this scent when alive, have it in a powerful degree on being destroyed in hot water, arising from the secretion of a scented mucus. The garlic scent is not, however, confined to this snail, as occasionally other branches of the Helix family have been found to possess it.

An inhabitant of woods, gardens, wet banks, and even in greenhouses. It is mostly found under stones, amongst decayed leaves, and at the roots of long grass. It occurs even at the summits of mountains.

In this neighbourhood it is fonnd at Sawley in extraordinary numbers, at Thrumpton, and at Highfield House.

More distant localities are, near Lancaster, Durham, and Gisborne Park, in Yorkshire (Brown), Kendal (Gough), Newcastle (Alder), London (Grey), Bristol (Miller), Penzance (Millet), Mount Edgecombe, near Plymouth (Jeffreys), and St. Faith's Wood, near Norwich (Bridgman).

In Scotland, Edinburgh and in Fifeshire (Brown), at Lerwick, in Shetland (Jeffreys). In Ireland (Thompson). France (Grey).

Zonites nitidulus (The Dull Snail). *Draparnaud.*

Figures 35 and 36.

35.

36.

Added by Mr. Grey, and published in the "*Medical Repository,*" in 1821.

The shell of the above species is in some degree flattened, and has a large and deep umbilicus. There are from four and a half to five convolutions. The colour is a pale or *yellowish-horn* above, being of a rather lighter hue beneath. It is opaque white around the umbilicus. The shell is well marked with longitudinal wrinkles. The aperture is rather oblique, and somewhat crescent shaped, being not so high as it is wide. A noticeable circumstance is the dull waxen appearance of the shell.

The diameter is three tenths of an inch.

The colour of the animal is *leaden,* being darker than that of Zonites cellarius, which it closely resembles in form.

There is a variety named Zonites Helmii, which is more transparent, and of a greenish-white tint.

Zonites nitidulus is frequently mistaken for a small specimen of Zonites cellarius, a little care being requisite to recognize the difference. It chiefly varies from the cellar snail in the shell being more concave beneath and more convex above than that species. It is also smaller, darker coloured, not so shiny, has a larger umbilicus for its size, the aperture less oblique, and the milky whiteness more confined to the edge of the umbilicus.

As yet it has been considered as a local species in England.

It is found in woods and at the sides of hedges, under stones and amongst moss.

In this neighbourhood it is found at Highfield House, Sawley, and at Nottingham Castle.

More remote localities are, Newcastle (Alder), Kendal (Gough), Scarborough (Bean), London (Grey), Essex (Sheppard), Norwich (Bridgman), North Devon, Kent, and Wilts (Jeffreys), and Penzance (Millett).

In the Isle of Man (Forbes).

Generally distributed in Ireland (Thompson).

On the Continent in Germany (Pfeiffer).

ZONITES PURUS (The Delicate Snail). *Alder.*

Figures 37 and 38.

38.

37.

This delicate and not very common shell is nearly smooth, glossy, transparent, depressed, and having a blunt apex. The mouth of the shell is placed obliquely; it is large, rounded, and not so high as it is broad. The peristome is thin, and is not reflected, Umbilicus deep and somewhat large. There are from three and a half to four convolutions. The shell is about two lines in diameter, and more frequently not so much.

There is a pale horn-coloured variety, probably owing to situation only.

In describing this shell, which more closely resembles Zonites crystallinus than any other British species, it may be remarked that it can be easily recognized from that snail from not having so many convolutions, the convolutions being not so closely set, having a larger umbilicus, the outer whorl larger in proportion to the others, and the shell somewhat larger and more convex.

The colour of the animal is white, with two black lines; the mantle white, marbled with black.

Specimens received from Mr. Alder and Mr. Damon closely resembled those found in this neighbourhood.

Zonites Purus was discovered by Mr. Alder, and described in 1830, in his "*List of Newcastle Shells.*"

It is an inhabitant of woods, amongst moss; also found under stones and decayed leaves; being most abundant in the north of England.

It is rare in this neighbourhood, but found at Oxton, Highfield House, Stanton, and Bulwell.

It is also found at Newcastle-upon-Tyne (Alder), and at Chaigeley and Thornley, Lancashire (The Author.)

In Ireland, Cabinteely, county of Dublin (Brown), and widely spread (Thompson).

Mr. Grey remarks it has not been found in Germany.

ZONITES RADIATULUS (The Rayed Snail). *Alder.*

Figures 39 and 40.

39.

40.

Recorded by Mr. J. Grey, in 1831, in "The Medical Repository."

A somewhat flat or depressed shell, polished, shining, pellucid, sunken spire, and blunt apex. Each whorl flattened where it joins an inner whorl, regularly wrinkled, the striæ appearing to extend continuously over all the convolutions, and being plainly visible. Rather large umbilicus; very oblique aperture; peristome not thickened. The colour is horn, or amber. There are from three and a half to four convolutions. Diameter two lines.

The colour of the animal is blue-black.

An inhabitant of wet mossy ditches, damp woods, and under stones in shady situations.

Specimens have been sent to the author from Newcastle, by Mr. Alder, and others from Mr. Bean, of Scarborough.

Found in this county in abundance amongst moss at Wollaton, and Highfield House, and sparingly at Stanton-on-the-Wolds, Oxton and Radford Grove.

Other localities are—Dovedale, Derbyshire (Thompson), Newcastle (Alder), Kendal (Gough), Reeth, near Richmond, Yorkshire (A. S. H. Lowe), London (Grey), Norwich (Bridgman), Chaigeley (The Author), Falls of the Clyde, Lanarkshire (Thompson), Ballantrae, Ayreshire (Thompson).

In Ireland—Londonderry, Dublin, Downshire, Antrim, Tyrone, Cork, and Queen's County (Thompson), Belfast (Hindeman).

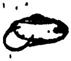
Widely spread in England, Scotland, and Ireland (Forbes).

Not found in Germany (Grey).

ZONITES EXCAVATUS (The Excavated Snail). *Bean.*

Figures 41 and 42.

41.



42.

It is with some hesitation that this snail is included in our Nottinghamshire shells, from a single, though undoubted, specimen, obtained near Sawley, on the border of this county.

It is fragile, depressed, polished, pellucid, horn-coloured; has five and a half to six close convolutions; blunt apex; small aperture, which is rounded; an exceedingly wide and deep umbilicus; thin peristome.

Diameter of the shell nearly a quarter of an inch.

The animal is lead-coloured.

It is very like *Zonites nitidus*, yet being more convex, and having a much larger umbilicus.

Zonites excavatus was discovered by Mr. Alder, of Newcastle, and described, in the year 1830, in his "List of Newcastle Shells."

Found under felled timber and decayed wood.

Localities:—Yorkshire, Northumberland, and Durham (Forbes), Newcastle (Alder), Scarborough (Bean). In the south of Scotland (Forbes). The Highlands (Alder). Cork (Miss King), and Galway (Thompson).

Professor Forbes remarks that it has not hitherto been discovered in any country excepting Great Britain.

Zonites nitidus (The Shining Snail). *Müller.*

Figures 43 and 44.

43.

44.

More generally known as the *Helix lucida* of Draparnaud, Alder, Turton, Thompson Brown, and L. Pfeiffer, and as the *Zonites Lucidus* of Grey. The present name has been adopted by Professor Forbes from the *Helix nitida* of Müller, Jeffreys, Lamark, and C. Pfeiffer.

It was added by Mr. J. E. Grey, and described, in 1821, in the "*Medical Repository.*"

A very lucid shell, of a browish horn-colour. It is depressed, pellucid, has from four and a half to five convolutions, a large umbilicus, and a nearly circular aperture. The spire is elevated in a small degree. Peristome not thickened.

Diameter a quarter of an inch.

The young conchologist will perhaps confound this species with the Zonites nitidulus, Z. cellarius, or Z. alliarius. It is, however, more convex, darker in colour, and does not possess that marked feature, the whiteness around the umbilicus.

The animal is dark in colour.

Found under stones, in damp and shady situations.

Although not a common species generally, it is tolerably abundant around Nottingham, being found at Highfield House, Beeston, Wollaton, Radford, and on Oxton Warren.

Other localities are—London (Grey), Cornwall and Devonshire (Montagu), South Wales, Swansea, and Somersetshire (Jeffreys), Whitlingham and St. Faiths, near Norwich, although more rare (Bridgman), Wolverhampton and Shrewsbury (Brown), Lytham and Chaigeley, Lancashire (The Author), Newcastle (Alder).

In Ireland, although rare; near Belfast, Portarlington and Finnoe (Thompson).

Common in the Island of Zetland (Fleming).

Described as a German shell by Pfeiffer, and as a French shell by Draparnaud.

It appears probable that the *Helix arborea* of Say may be this species, and, if so, it is also an American shell.

Specimens have been received from Mr. Bean, of Scarborough, and Mr. Alder, of Newcastle; they do not differ from those found near Nottingham.

The eggs are more oblong than globular, and possess a calcareous shell. They are laid principally in May or June, yet commence in March and cease in September. Two are not deposited in the same place. They lay from 30 to 50 eggs, which are from fifteen to sixteen days before they hatch, and are fourteen months before they arrive at maturity.

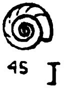
This species is occasionally found congregated in large numbers in pine beds and damp hothouses, producing sad havoc to the plants.

Mr. Morris has found it fossil in the mammaliferous crag on the banks of the Thames, near London.

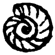
ZONITES CRYSTALLINUS (The Crystalline Snail).

Müller.

Figures 45 and 46.



45



46.

This very pretty, minute, and delicate-looking crystalline shell is almost flat, pellucid, polished, milky-white in colour, smooth, blunt apex, and aperture lunate. There are from five to six convolutions. The peristome is not thickened, and the umbilicus, although small, is deep.

Diameter usually exceeds the eighth of an inch.

Described by Mr. J. E. Grey, in the year 1821, in the "*Medical Repository.*"

Inhabits damp situations, amongst moss and decayed leaves, and under stones.

It appears to be an active snail, and capable of enduring colder weather than many of our Helices.

In this neighbourhood it is found sparingly at Highfield House, Stanton-on-the-Wolds, and Wollaton.

Other localities are—Bristol (Miller), Wiltshire (Montagu), Essex (Sheppard), Kendal (Gough), Thornley and Chaigeley, Lancashire (The Author), Newcastle (Alder), Norwich (Bridgman), Grantham (The Author).

The Isle of Man (Forbes). Near Edinburgh (Gerard). General in Ireland (Thompson).

On the Continent, in France (Draparnaud), in Germany (Pfeiffer), and in Sweden (Nilson).

The branch of snails under the family head of Zonites are thus, without a single exception, found in the immediate neighbourhood of Nottingham.

HELIX.

This is a spiral shell, having a lunate aperture, which is thickened, and the peristome mostly reflexed. It is chiefly stout and opaque, occasionally, however, being semitransparent and thin. Generally globose.

The animal is tolerably large for the size of the shell. There are four tentacles. The tail is pointed, and the foot frequently large. The mantle does not cover the edge of the mouth.

Some of the species are well known to every one, owing to their size, abundance, and habits.

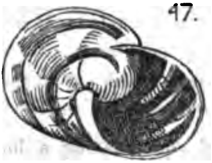
The Helix tribe vary from that of the Zonites chiefly in the edge of the mouth. In the former it is thickened, and the peristome mostly reflexed, whilst in the latter the edge is thin and the peristome not reflexed. The Helix is for the most part more solid, more opaque, more globular, and has not so glossy an appearance.

The animal varies in the form of the tail, that of the Helix being lanceolate, whilst in the Zonites it is truncate.

Professor Forbes remarks that the edge-tooth of the tongue of the Zonites is aculeate, whilst that of Helix is serrated.

Helix aspersa (The Common Snail). *Müller.*

Figure 47.



Perhaps this very abundant and somewhat handsome shell is as familiar as any of our British species, for it is the largest of the Helix family, with the exception of the very local Helix pomatia, and is moreover well known as a destructive gardener.

In form it is rather subglobose, has from four to four and a half convolutions, with a blunt apex. Aperture somewhat rounded. Peristome snowy-white, spread out, and reflected. Olive-coloured, with in general four dark-brown bands. The shell has a rough surface, and although apparently strong, is nevertheless very fragile and thin.

The usual diameter is an inch and a half.

The colour of the animal is a greyish green.

Helix aspersa is very sensitive to cold, closing its aperture in a similar manner to Helix nemoralis, on the first approach of frost. When induced to wake up and crawl about with the occasionally mild days of March, in will again become dormant on the return of frosty weather.

It has long been esteemed as a dainty food by some, and for culinary purposes vast numbers are exported in barrels to America. This long journey it is found to endure exceedingly well. It is also considered as a cure for pulmonary diseases, great numbers being conveyed to the London markets for those persons who are troubled with chest complaints. Thus it has attained a degree of popularity which has spread it all over the world. The introduction of this shell into the United States has been attended with success, and it is now becoming common in that country.

Helix aspersa attains the largest size in Algiers.

It was first described by Dr. Lister, in the year 1678.

An inhabitant of gardens, and especially abundant on walls surrounded by nettles, elder, and weeds.

On opening a dry drain in Beeston, near where this snail is exceedingly abundant, I was surprised to find at one spot no less than a hundred empty shells lying together within the space of a few inches. At first this great slaughter was attributed to toads, but on further search a large ant's nest was discovered beneath the stone immediately above the drain, in which were a few more empty shells. This, together with the ferocious manner in which they attacked them when placed in their nest, convinced me that their death resulted from having intruded within the ant's abode, for which liberty they paid the penalty of their lives.

The Helix aspersa is very destructive to plants, yet seems to prefer the varieties of Primula vulgaris, nettles, elder, and wild celery.

A specimen which had its shell accidentally broken, was, after a few days, noticed to be crawling about without one, and for many days was observed alive, yet devoid of a shell.

This species is gregarious in its habits. On a wall overgrown with the pretty fern Ceterax officinalis, in the neighbourhood of Bathford, in Somersetshire, vast numbers were observed congregated under the leaves. In a similar manner they are found in the Nottingham Castle-yard.

The specimens received from the Isle of Wight appear to have less of the dark markings than those found in this neighbourhood. Mr. W. K. Bridgman has forwarded a specimen said to be not uncommon in the vicinity of Norwich; it is of a uniform dull cream-colour. A similar variety was in the collection of the late Mr. Kenyon, of Preston, said to have been procured in Suffolk.

The eggs of Helix aspersa are deposited in holes dug at the roots of grass and at the foot of trees. According to M. Bouchard Chatereaux, from 100 to 110 eggs are laid at one time. These are deposited from the month of May till that of October; they are from fifteen to thirty days in hatching, and are thirteen months before fully grown. The common period of copulation is the latter end of May and the beginning of June, after which each individual deposits eggs, for the same animal possesses both the male and female organs.

This mollusc climbs trees and walls, and may be found resting upon them during the daytime many feet from the ground, and more especially on the apple and scented poplar.

As an instance of the length of time which this snail can live without food, it may be mentioned that a specimen remained stationary for many weeks under the eaves of my house. It ascended on the 2nd of August, and had commenced a descent before the thunder storm of September 6th. It was washed down by the violence of the rain during its continuance, but was found where it could not have procured food, and again placed on the wall of the house, which it ascended, and continued near the roof until November 11th, when the heavy rains washed it down a second time. It was deposited in a box covered with network, and was first fed with cabbage on the 18th, having fasted 108 days. This circumstance in winter would not be remarkable, but in summer, with the snail continually moving about, it is extraordinary that it could fast so long. It is worthy of remark that it has increased considerably in size.

Although so abundant, this is a very local species, apparently owing to a dislike of argellaceous soils. It is abundant around the village of Beeston, also at Broadgate, Lenton, and in the gardens near Nottingham, especially in the Castle yard. I have not found a single specimen at Highfield House, although it approaches within half a mile on either side.

Amongst the other most numerous localities may be mentioned Penzance (Millett), Bathford and Bath (The Author), Kent and Dorset (Montagu), London (Grey), Essex (Sheppard), Gravesend (The Author), Whepstead, near Bury St. Edmunds (Image), Norwich (Bridgman), Harlston, Norfolk (Bloxam), Grantham (The Author), Calke Abbey, near Derby (Bloxam), Preston (Winstanley), Lytham (The Author), Newcastle (Alder), Hartwell House, Bucks. (S. Horton).

Isle of Wight (A. H. Lowe), Scilly Isles (Millett), Isle of Man (Forbes), Scotland (Laskey), Ireland, widely spread (Brown).

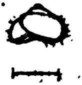
On the Continent, in Germany (Pfeiffer), Corsica (Payraudeau), Algiers (Grey), France (Draparnaud), and in Brazil (Grey).

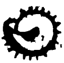
Although a tolerably strong shell, I am not aware that it has ever been found fossil.

HELIX REVELATA (The Green Snail). *Férussac.*

Figures 48 and 49.

48.





49.

This very rare and pretty shell is in form subglobose; it is fragile, pellucid, of an olive-green tint, and has four convolutions, the last being wide The shell is scattered over with downy hairs, and is also wrinkled. Umbilicus small. The apex blunt, and spire not much produced. Mouth circular, lunate, and large. Peristome thin.

Diameter a quarter of an inch.

Animal grey, with yellowish sides and foot; head and tentacles dark.

Inhabits shady situations, amongst nettles, moss, and decaying leaves.

Added by Professor Edward Forbes, in 1839.

This species was discovered in the latter end of September, 1851, amongst moss and fallen leaves, under an oak tree, at Stanton-on-the-Wolds, where three specimens were obtained. Professor Forbes, in his History of the British Mollusca [Vol. 4, p. 71], remarks on this discovery, "Mr. Lowe, of Nottingham, has lately sent us specimens found by himself at Stanton-on-the-Wolds, a very anomalous locality." A specimen has also been sent to Mr. Jeffreys, of Swansea, who likewise pronounces it an undoubted Helix revelata.

Localities:—Guernsey, near Doyle's Monument

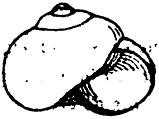
(Forbes), near Torquay, rare (Hanley), Megavissey, rare (Couch), Pendennis, Cornwall, rare (Cocks), Devon, rare (Bellamy).

In the south of France (Grey).

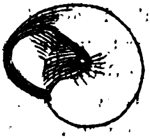
Helix nemoralis (The Girdled Snail). *Linnæus.*

Figures 50 and 51.

50.



51.



In describing this most abundant and beautiful snail, it may be remarked that it is exceedingly varied in colour, and in the number of the dark bands by which it is encircled. From its size and habits, this species is familiar to most persons, and is not easily confounded with any other species. The form is in some degree globular, with the spire slightly elevated. The surface is polished. There are five convolutions. The aperture somewhat crescent-shaped; peristome much reflected, and thickened within. The colour is very various, being yellow, with a dark brown rim around the aperture; others brown, but chiefly banded on nearly white, yellow, or brownish ground tints. Some specimens are greenish yellow, with three narrow brown bands; others with five broader belts, being darker and wider in places; pink, with four bands, the three lower ones broad, and of a dark red-brown colour, the separations between the bands very narrow; brownish pink, with a broad band nearly occupying the whole whorl, having a second narrow band immediately above it; and pink, with five pale brown bands. These are the more common colours, but the size, shape, and colours are so varied that it would be difficult to enumerate them all.

The usual diameter is seven-eighths of an inch. The largest specimen taken in this neighbourhood measured exactly an inch in diameter.

The colour of the animal is yellowish green, becoming darker as the individuals become older; the darker shells have a darker-coloured animal than the paler ones.

Helix nemoralis is one of the six species of shells described by Merrit, in the year 1667, in his "Pinax rerum Naturalium Britannicarum."

According to Grey, it attains a very large size in Portugal, and is very small on the Swiss mountains.

It has been introduced into Canada and the United States, where it is becoming common.

Sowerby says this Helix will eat earth worms, and even cooked meat.

A parasitic insect lives on this species; it is the lava of *Drilus flavescens*.

Although in dry weather not a single living specimen is to be found, yet, an hour after a shower, the banks which they frequent are literally covered with them.

In cold weather, they retire into holes in the ground, or amongst grass roots, and rubbish. In winter they close the mouth of their shells with a semi-transparent mucous covering, after which the animals retire considerably further into the shell, and then form a second thin covering immediately before them, under which they remain comfortably housed until the warmth of spring invites them to burst open their coverings, and come forth to enjoy the genial weather and make a good meal after a four months' fast.

It is an inhabitant of hedges, banks overrun with weeds, woods, and other shady situations, apparently partial to nettles.

In this neighbourhood it is common near Highfield House, Beeston, Thrumpton, Sawley, Stanton-on-the-Wolds, and other places.

Amongst the hundreds of localities that might be enumerated, the following are selected:—Penzance (R. T. Millett), Bristol (Miller), Kent and Dorset (Montagu), Worthing (The Author), Wiltshire (Montagu), Bath and Bathford (The Author), Essex (Sheppard), Suffolk (Paget), Harlston, Norfolk (Bloxam), Gravesend (The Author), Calke Abbey, Derbyshire (Bloxam), Matlock (The Author), Norwich (Bridgman), Yorkshire (Leyland), Exmouth (Damon), Grantham (The Author), Hartwell, Buckinghamshire (J. B. Reade), Chaigeley (Winstanley), Lytham (The Author), Kendal (Gough), Crosby (The Author), Scotland (Laskey), Ireland (Brown), Islands of Arran large (Thompson), Isle of Wight (A. H. Lowe), Isle of Man (Forbes), St. Mary's Island, Scilly (Millett).

On the Continent, in France (Draparnaud), Germany (Pfeiffer), Switzerland (Grey), Sweden (Nilson), Portugal (Grey), and Corsica (Payradeau).

It is found fossil, with remains of mammalia, at Greys, Erith, Copford, Sutton, and Ilford, on the banks of the Thames, near London (Morris).

M. Bouchard Chautereaux has found that this species lays from 50 to 80 eggs, from May to October, which hatch in from 15 to 20 days. The young become fully grown in from 11 to 13 months. The eggs are ovate and white.

Professor Forbes considers the Helix hortensis of Grey, Alder, Jeffreys, Müller, Draparnaud, &c, and the Helix hybrida of Grey, Brown, and Pioret as only varieties of Helix nemoralis; as such they will at present be considered, although I feel persuaded the Helix hortensis will eventually be found to be a distinct species.

Figures 52 and 53.

52.

53.

VAR. HELIX HORTENSIS [The Garden Snail, see figs. 52 & 35] is as various in its colours, markings, and form as Helix nemoralis; the great distinctive differences are, first, in being a fourth smaller than that of nemoralis; secondly, in having a white margin around the aperture instead of a dark one; and third, in being more polished. The variation in the colour of the animal is as great in H. nemoralis as it is in H. hortensis.

One specimen of this shell has been taken in this neighbourhood; near Bulwell.

The localities more distant are, London (Grey), Kent and Dorset (Montagu), Bristol (Miller), Wiltshire (Montagu), Essex (Sheppard), Penzance (Millet), Exmouth (Damon); Norwich (Bridgman), Harlston, Norfolk (Bloxam), Dublin (Brown), Isle of Man (Forbes), Germany (Pfeiffer), Sweden (Nilson).

The usual diameter of Helix hortensis is three-quarters of an inch.

HELIX NEMORALIS VAR. HYBRIDA (The Brown Mouthed Snail) seems to form a connecting link between H. nemoralis and H. hortensis. Its character is intermediate between these shells. The colour is brown, or yellow with brown bands; the edge of the aperture is pale brown, and the colour internally usually pink.

Two specimens only have been found here; near Highfield House.

It is found at Stella, near Newcastle (Alder), Kent and Dorset (Montagu), London (Grey), Norwich (Bridgman), and Halifax (Leyland).

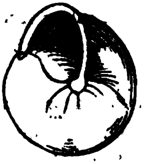
Neither this nor Helix hortensis are so common as Helix nemoralis.

Other varieties have been recognized by some authors, as the one-banded, known as the Helix cincta of Sheppard, and the five-banded, the Helix fasciata of Sheppard; the latter two named can hardly be recognized even as varieties. It is possible, say some authors, that the variety hybrida may be the hybrid progeny of Helix nemoralis and Helix hortensis. One circumstance, however, convinces me that this is not the case, for I found the variety hybrida in the *Star-hills*, near Lytham, where Helix nemoralis is extremely abundant, and where the variety hortensis is not found.

There are several curious facts observable on the *Star-hills* with respect to Helix nemoralis: they are remarkably small, frequently have the epidermis worn off so as to be taken for dead specimens (owing perhaps to their living amongst so much dry sand and their near proximity to the sea), and vast numbers are destroyed by either birds or rats, the empty shells being deposited in large heaps, every specimen having a hole made in it in the centre of the body-whorl, evidently for the express purpose of extracting the animal. The mucous covering is made so strong on these hills that it can be extracted from the animal in a perfect state; it is of the consistency of thin blotting-paper.

HELIX ARBUSTORUM (The Shrub Snail). *Linnæus.*

Figures 54 and 55.



54.

55.

This pretty and interesting shell, although in its general appearance it more closely resembles Helix hortensis than any other British species, may readily be distinguished from that snail. When in motion it carries the shell more erect and higher than Helix nemoralis, and also crawls at a greater speed.

The form of the shell is somewhat globose, rich brown in colour, closely blotched with pale brown, and having a single dark band encircling it. The aperture is roundish-lunate, the peristome being milky-white in colour and reflexed. The shell is moderately thick, and polished. Spire somewhat elevated. It has six convolutions. The umbilicus scarcely discernible.

About three-quarters of an inch is the usual diameter. The diameter of specimens procured near Thrumpton is ten lines; height three-quarters of an inch. Specimens from this locality are very rich in colour and marbling, and the band is very dark. Those from Weymouth are three-quarters of an inch in diameter, and five-eighths of an inch high.

The animal is dark in colour, being leaden-black.

It is longer, but narrower than Helix nemoralis.

A variety with a pale straw-coloured shell, marbled with white, and destitute of the dark band, has been forwarded by Mr. W. K. Bridgman, as being found not uncommonly near Norwich. And an intermediate variety between this and the ordinary typical form has been sent by Mr. R. Damon, as procured near Weymouth.

An inhabitant of moist woods, and near water, amongst willows, nettles, moss, and couch-grass.

Described by Dr. Lister, in the year 1678.

Professor Forbes remarks that it extends to a higher elevation on mountains than any other of our large Helices, and although the specimens are small as found on the Swiss Alps, yet is is observed almost to the limit of eternal snow.

Notwithstanding it is a widely-spread species, it is not very abundant, and rather local.

In this neighbourhood it has been found, amongst nettles and coarse grass, near the River Soar, at Thrumpton; and near the Trent, at Sawley. In neither of these places is it abundant.

Other recorded localities are—Bristol (Miller), Wiltshire, Dorsetshire, and Kent (Montagu), Essex (Sheppard), London (Grey), Surrey, Hampshire, and Derbyshire (Maton), Hunstanton, Norfolk, and Calke Abbey, Derbyshire (Bloxam), Whitlingham Wood and Lakenham, near Norwich (Bridgman), Chaigeley, Lancashire (Winstanley), Kendal (Gough), Newcastle (Alder).

Generally distributed in Ireland and Scotland (Brown).

Orkney and Zetland Islands (Fleming).

On the Continent, in France (Draparnaud), Germany (Pfeiffer), Sweden (Nilson), and Switzerland (Forbes).

Not found fossil.

HELIX VIRGATA (The Zoned Snail). *Da Costa.*

Figures 56 and 57.

56.

57.

It is with some hesitation that the above shell is included amongst the species found in the neighbourhood of Nottingham, one specimen only having been discovered amongst stones near Highfield House. It was alive when taken. Probably it may have been introduced, as the locality is a very unlikely one for this species.

It was described by Dr. Lister, in 1678.

Top-shaped, smooth, opaque, aperture round and slightly tinged with red, umbilicus of a moderate size.

Colour white, with rich brown bands.

It varies in size from a quarter to three-quarters of an inch in diameter.

There are from five to six convolutions.

Varieties are sometimes brownish, and others white without bands.

Specimens received from Dublin, Isle of Wight, Bath, and Penzance, show the same variations.

Found in chalk and limestone districts, and especially near the sea shore.

Breeds in September and October, laying from 40 to 60 eggs at a time, which are from 15 to 20 days in hatching, and from one and a half to two years in coming to maturity (M. Bouchaud Chatereaux).

Some of the localities recorded are—Penzance (Millett), Cornwall (Maton), Kent and Dorsetshire (Montagu), Bath (The Author), Devonshire (Alder), Wiltshire (Montagu), Essex (Sheppard), Bristol (Miller), London (Grey), Cambridge (Maton), Swaffham, near Norwich (Bridgman), and Newcastle (Alder).

In Ireland, Dublin (Alder), King's County, Queen's County, and Kildare (Brown).

In Wales, at Swansea (Jeffreys).

The Isle of Wight (A. H. Lowe), Iona (Lowe), St. Mary's Island, Scilly (Millett).

Widely-spread throughout Central and Southern Europe (Forbes), Germany (Pfeiffer), Corsica (Payradeau), Sandwich Islands (Fleming), and introduced into the United States (Grey).

HELIX CAPERATA (The Black-tipped Snail). *Montagu.*

Figures 58 and 59.

58.

59.

In the latter end of the last century Dr. Pulteney added this snail, in his catalogue of Dorsetshire shells.

Shell globular, but slightly depressed, apex blunt, aperture small and crescent-shaped, the margin being white in the interior. A moderately-sized and deep umbilicus. Shell yellowish straw-coloured, with brown bands, and raised wrinkles. There are six convolutions.

The ordinary size is three-eighths of an inch. In this neighbourhood it is not so large, four lines in length being a fine specimen. Professor Forbes says his largest example is more than five lines in diameter.

The colour of the animal is grey, with darker tentacles, from which a dusky belt is continued down the neck.

Specimens of a very pretty variety have been sent by Mr. Bridgman, of Norwich, found at Thorp, in that neighbourhood. This variety resembles Helix virgata so closely, being banded like that species, that at first sight it would be taken for the *Zoned Snail;* a more attentive inspection shows the snail to be a variety of H. caperata, as it is considerably more depressed, and is very plainly concentrically striated, whilst the H. virgata is devoid of striæ. Fine specimens of this variety are five lines in diameter.

Another variety has been found at Stanton-on-the-

Wolds. It is of a trochiform or top shape, a form very similar to that of H. virgata. It is rare.

Helix caperata appears to inhabit trap and calcareous districts.

From the investigations of M. Bouchard Chatereaux we learn that it deposits from 35 to 40 eggs at a time. between the months of July and October. These are hatched in from 15 to 20 days, and are fully grown in a year.

In this neighbourhood it has only been found in one locality, a solitary field at Stanton-on-the-Wolds. When first observed, which was after a smart shower of rain, in the month of September, it was so numerous that almost every blade of grass contained one or more of these snails clinging to it; subsequent visits happening to be on dry days, none but dead specimens could be procured, and it was feared that this solitary locality might be destroyed, but a rainy day last autumn brought with it a similar number to those before observed. Thus this species buries itself in the ground during dry weather.

The more distant places where it is found are—Penzance (Millett), Wiltshire, Cornwall, Stanborough, Woolcomb, and Plymouth (Montagu), Bristol (Miller), Whitesand Bay, near Plymouth (Jeffreys), Swansea (Jeffreys), Harleston, Norfolk (Bloxam), Torquay, and Spetisbury, Dorsetshire (Maton), Norwich (Bridgman), Kent (Boys), Essex (Sheppard), Kendal (Gough), Newcastle (Alder), Calke Abbey, Derbyshire (Bloxam), Lytham (The Author), Cumberland (Brown).

Scotland (Fleming), Aberdeen (Macgillivray), Salisbury Crags, Edinburgh (Brown), Musselburgh (Laskey).

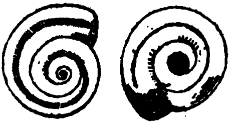
Dublin (Brown), Kingstown, near Dublin (Warren), Kilkee Castle, Ballitore, La Bergerie (Patterson), Naas, County Kildare (Brown), and Glenmire, near Cork (Harvey).

Isle of Man (Forbes), Isle of Wight (A. H. Lowe), Isle of Portland (Maton), St. Mary's Island, Scilly (Millett).

Germany (Pfeiffer), and Corsica (Payradeau).

HELIX ERICETORUM (The Heath Snail). *Müller.*
Figures 60 and 61.

60. 61.



Added by Dr. Lister, in 1678.

A depressed shell, not quite opaque; aperture small and rounded, umbilicus large and deep. A strong shell, slightly striated; thin peristome, which is not reflexed; spire scarcely raised. Six convolutions. Colour dirty-white, banded with yellowish brown.

Diameter four-fifths of an inch. In this neighbourhood the largest specimen obtained measures three-quarters of an inch in diameter.

The colour of the animal is pale green.

Mr. Bridgman has sent me specimens without any coloured bands. [They appear to be the H. obliterata of Hartmann.] I have since found this variety near Bath, amongst limestone rocks, in a rabbit warren.

According to M. Bouchard Chantereaux, it begins to lay eggs in July, and continues to deposit them until November, laying from 40 to 60 at a time, which are hatched in three weeks, and fully grown in eighteen months.

Inhabits dry heaths and open fields, especially in calcareous districts.

In dry weather they are found clinging together on weeds and branches of trees in hedges, associated with Helix hispida, and especially on the long stems of couch grass, yet it is singular that no examples more than half-grown are found in this situation; the older snails appear to bury themselves in the ground.

In Nottinghamshire it has only been found at Stanton-on-the-Wolds, where it is abundant. Fully-grown specimens, however, are rare.

The following places are recorded for this snail:—Near Hayne and Landsend, Cornwall (Millett), Dorsetshire and Kent (Montagu), Bristol (Miller), Wiltshire (Montagu), Essex (Sheppard), London (Grey), Bath (The Author), Harlston, Norfolk (Bloxam), Norwich (Bridgman), Kendal (Gough), Newcastle (Alder).

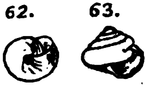
Dublin (Brown), near Golden Bridge, Dublin (Stephens), Dunlace Castle and Portarlington (Thompson).

In the North of Scotland (Forbes), Islands of Iona (Jeffreys and Hanson), Isle of Man (Forbes).

On the Continent, in Germany (Pfeiffer), Corsica (Payradeau), Sweden (Nilson), and France (Draparnaud).

HELIX HISPIDA (The Bristly Snail). *Linnæus.*

Figures 62 and 63.



In describing this exceedingly abundant shell, which varies much both in size and general appearance, it is necessary to bestow more space to it than would otherwise be warranted to so common a species.

The shell is somewhat convex, dull looking, fragile, and generally semi-transparent [although some of the varieties are nearly opaque]. Horn-coloured, having, in occasional specimens, a pale band in the centre of the largest whorl. The shell is scattered over with innumerable bristles. Umbilicus deep, and moderately large, aperture small and roundish lunate, and peristome acute, not reflexed, but ribbed internally with white. There are from five to six convolutions.

Diameter a quarter of an inch. Large examples measure four and a half lines.

The colour of the animal is greyish.

As above stated it is liable to considerable variation in both form and general appearance, which circumstance caused a division into several seemingly distinct species. Mr. Grey had doubts of their being more than varieties, and in the British Mollusca of Messrs. Forbes and Hanley they are now all gathered together again. Of these formerly alleged species may be mentioned the Helix concinna of Jeffreys, Alder, Grey, Thompson and Brown; the H. depilata of Alder, Grey, and Brown; and the H. sericea of C. Pfeiffer, Alder, Grey, and Brown.

The var. H. concinna [or neat snail] is larger, thicker, has a wider umbilicus, and fewer hairs than the usual form of H. hispida.

The var. H. depilata [or bald snail] is not hispid, but in other respects does not vary in any marked degree from the true H. hispida. It is however slightly more flattened, with the convolutions rounder, and the peristome more thickened.

The var. H. sericea [or silky snail] is thickly covered with soft hairs, is thinner than H. hispida, has a smaller umbilicus, is darker in colour, and more globular than that species.

The hairs on the shell of H. hispida appear to be very loosely attached, as it frequently happens that immersing a very hispid variety in hot water, for the purpose of extracting the animal, is found to have caused all the hairs to fall off.

First described by Petiver, about the year 1770, in "Gazophylacium." In 1838 Mr. Alder separated H. sericea from H. hispida; in 1829 Mr. Jeffreys H. concinna from that species; and in 1837 Mr. Alder separated H. depilata.

Inhabits woods, hedge bottoms, and moist places, beneath stones, long grass, and fallen timber.

During dry weather it is found in great abundance, clinging to the under-side of nettle leaves, boughs of trees in hedges, and to long grass.

This species begins to lay eggs in April, and continues laying till September, depositing from 40 to 50 at a time, which hatch in fifteen days, and require from fifteen to sixteen months to become fully grown (M. Bouchard Chautereaux).

Several specimens lived under water for some days.

In this neighbourhood it is found [together with all the varieties] at Sawley, Thrumpton, Beeston, Wollaton, Highfield House, Radford, Basford, Lenton, Nottingham, Bulwell, Mansfield, Sherwood, Stanton-on-the-Wolds, &c.

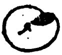
Some few of the countless other localities of this very abundant shell are inserted as examples:—Penzance (Millett), Penryn, Cornwall, Devonshire, Wiltshire, and Kent (Montagu), Bristol (Miller), Essex (Sheppard), Dorsetshire (Pulteney), London (Grey), Suffolk (Paget), Norwich (Bridgman), Hampshire and Lincolnshire (Da Costa), Spetisbury (Maton), Norfolk (Bloxam), Tenby (Goodall), Bath (The Author), Stone, Buckinghamshire (Rev. J. B. Reade), Hartwell House, near Aylesbury (The Author), Derbyshire (Bloxam), Matlock (The Author), Preston (Kenyon), Chaigeley, near Clitheroe (Winstanley), Lytham (The Author), Kendal (Gough), Newcastle (Alder), Darlington, Durham (Graham), Dublin (Brown), Belfast (Thompson), Isle of Man (Forbes), Isle of Wight (A. H. Lowe), St. Mary's Island, Scilly (Millett), Germany (Pfeiffer), Sweden (Nilson), and France (Draparnaud).

Mr. Morris records it as found fossil in the mammaliferous crag near London.

HELIX SERICEA. *Draparnaud.*

Figures 64 and 65.

64.



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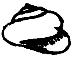


The Helix sericea of Draparnaud, Jeffreys, Turton, Lamark, Pfeiffer, and Rossmassler is no doubt better known in this country as the H. granulata of Alder, Grey, and Brown.

Described by Montagu, in 1803, in his "*British Testacea,*" under the name of H. granulata.

It must not be confused with the Helix sericea of Brown and Grey, which is only a very hispid form of H. hispida.

The shell is globular, yet slightly depressed, pellucid, exceedingly downy, fragile, aperture roundish lunate, umbilicus very minute; pale horn-colour. From five to six swollen convolutions.

Diameter of the shell nearly the third of an inch.

Colour of the animal yellowish white, the mantle being marbled with black, the spots of which are visible through this thin shell.

It is a widely spread, although a somewhat local, species.

Inhabits damp places, especially amongst moss in moist woods.

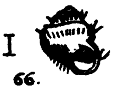
Specimens received from Mr. Millett, of Penzance, and Mr. Alder, of Newcastle, are larger than those procured near Nottingham.

In this neighbourhood it is rare, occasional specimens having been found on the bogs of Oxton and Bulwell.

It is found at Penzance (Millett), Cornwall, Devonshire, Kent, and Dorsetshire (Montagu), South Wales (Jeffreys), Heigham Osier Carr, near Norwich (Bridgman), Wiltshire and Lincolnshire (Brown), London (Grey), Newcastle (Alder), Northumberland and King's Park, Edinburgh (Brown), Belgrove, near Cork (Humphreys), Naas, County of Kildare, and Downpatrick (Brown), Limerick and Ballitore (Harvey), Isle of Man (Forbes), St. Mary's Island, Scilly (Millett), and France (Draparnaud).

HELIX ACULEATA (The Prickly Snail). *Müller.*

Figure 66.



Added in 1786, by Mr. Lightfoot, in a paper printed in the "*Philosophical Transactions*" of the Royal Society.

The form of this singular, minute, yet very interesting shell, is conical; it is fragile, semi-transparent, and of a brownish-horn colour. It has the appearance of having large prickles dispersed over the shell, owing to the peristraca shooting out into spinous foliations. The convolutions, which are four in number, are circular, and deeply separated; the spire raised, aperture somewhat round, and the umbilicus copious and deep.

Diameter a tenth of an inch, and as much high.

The colour of the animal is greyish. The tentacles are lengthy.

Found in woods, plantations, and under hedges, amongst moss, leaves, and stones, yet, owing to the dull and dirt-like appearance of the shell, it is difficult to observe. It is most abundant after rain.

Mr. Jeffreys, of Norton House, near Swansea, informs us that it feeds on the *Jungermannia platyphylla.* In this neighbourhood it is most abundant on fallen holly leaves, on which it also doubtless feeds.

There are only two localities near Nottingham where it has as yet been found, viz., Highfield House, where it is abundant, and Stanton-on-the-Wolds, where it is rare.

Specimens have been sent from Penzance by Mr. R. T. Millett, from Scarborough by Mr. W. Bean, and from Newcastle by Mr. J. Alder; they do not differ from those found near Nottingham.

Distant localities are—Penzance (Millett), Cornwall, Dorsetshire, and Kent (Montagu), South Wales (Jeffreys), Lackham, Wiltshire, and Kingsbridge, Devonshire (Montagu), Spetisburgh, Dorsetshire (Rackett), Essex (Sheppard), near Bulstrode, Buckinghamshire (Agnew), Caistor and St. Faith's Wood, near Norwich (Bridgman), Dovedale, Derbyshire (Brown), Scarborough (Bean), Kendal (Gough), Newcastle (Alder), and Twizel, in Northumberland (Brown).

In Scotland, at Lomond Hill, Fifeshire, and Hopetoun, Linlithgowshire (Brown), and Tarvel Mill, near Cupar, Fifeshire (Fleming).

In Ireland, generally distributed (Brown), Portmarnock, County Dublin (Warren), Ben Bulben, County Sligo (Thompson), and Miltown, Malbay (Harvey).

On the Continent, in Sweden (Nilson), extending to the north of Sweden (Grey), in Germany (Pfeiffer), and in France (Draparnaud).

HELIX FULVA (The Top-shaped Snail).

Figures 67 and 68.

67.

68.

This pretty, shining, smooth, and polished shell is trochiform. There are six convolutions, which are convex, but very narrow. Horn-coloured; aperture small and crescent-shaped, very minute umbilicus, which is hidden in the older examples by the reflection of the columella.

Diameter from a tenth to a sixth of an inch. Large specimens in this neighbourhood are an eighth of an inch in diameter.

The shell appears to be darker coloured and more glossy in damp situations.

The colour of the animal is grey.

Described by Dr. Lister, in 1678.

Helix fulva is very active, crawling at a rapid pace.

There are two varieties of this species, viz.:—

Var. Alderii, recognized by Mr. Alder, of Newcastle. Smaller and darker.

Var. Mortonii, noticed by Mr. Jeffreys, of Swansea. Depressed, both sides of the shell being nearly equally convex.

An inhabitant of woods and hedges, under leaves, stones, and amongst moss.

In this neighbourhood it is not abundant; the most common locality is at the foot of the gypsum hill at Thrumpton. Found also at Highfield House, Stanton-on-the-Wolds, Wollaton, and on Oxton bogs.

Other recorded localities are—Penzance (Millett), Cornwall, Devonshire, Wiltshire, South Wales, Somersetshire, Tenby, Crymlin Burrows, and Marino, near Swansea (Jeffreys), Kent and Dorset (Montagu), Essex

(Sheppard), Eton (Goodall), Whitlingham and St Faith's Wood, near Norwich (Bridgman), London (Grey), Northampton (Morton), Calke Abbey, Derbyshire (Bloxam), Hemsley, Blackmore Castle (Winstanley), Kendal (Gough), Newcastle (Alder), and Cumberland Mountains (Hudson).

In Ireland, generally distributed (Thompson), Belfast (Hyndeman), Rathgael House, County of Down (Cleland), and Wolf-hill, where it is very abundant (Thompson).

On the Continent, in France (Draparnaud).

Mr. Morris has found it fossil, with remains of mammalia, at Grays, Erith, Copford, Sutton, and Ilford, on the banks of the Thames, near London.

HELIX PULCHELLA (The White Snail). *Müller*.

Figures 69 and 70.

69.

70.

The small yet very pretty Helix pulchella has a opaque dusky-white shell. In form it is considerably depressed, being equally convex on both sides. Apex blunt, aperture almost circular, with a flat and broadly reflexed edge of a milky-white colour. There are three and a half convolutions. The umbilicus is capacious and profound.

The usual diameter is from the ninth to the tenth of an inch.

Colour of the animal black; eyes white.

It inhabits walls, under stones and ivy leaves; also under stones on the ground. Found in both dry and damp situations.

There is a variety named *H. Crenella*, which is remarkable for the raised bands or belts which cross the shell. The animal is described as different, and to inhabit damp places. Very many examples, both of the common form of H. pulchella and the var. crenella, procured from the neighbourhood, have been carefully examined, but no difference can be found in the appearance of the animal in either form, and the var. crenella is most abundant in dry situations.

Added by Boys, in 1784, in "*Walker's Minute Shells.*"

The var. crenella was noticed by Lightfoot, in 1786, see " *Philosophical Transactions* "

We learn from M. Bouchard Chautereaux that it lays eggs from July to September, ten to twenty at a time, which hatch in from fifteen to twenty days, and arrive at maturity in a year.

Our localities are, Highfield House, where it is rather common, Oxton, Bulwell, Beeston, and Stanton-on-the-Wolds, where it is rare.

It is well distributed in England, Scotland, and Ireland, being found at Penzance (Millett), Bristol (Miller), Wilts, Kent, and Dorset (Montagu), Essex (Sheppard), London (Grey), Suffolk (Paget), Norwich (Bridgman). Stone, Bucks. (Rev. J. B. Reade), Grantham (The Author), Calke Abbey, Derbyshire (Bloxam), Kendal (Gough), and Newcastle (Alder).

Dublin and Portmarnock Rabbit Burrow (Brown), Lough Strangford (Thompson), Carolina Park, near Edinburgh (Brown), Isle of Man (Forbes), Scotland (Fleming), St. Mary's Island, Scilly (Millett).

Abroad, it occurs in Germany (Pfeiffer), Corsica (Payradeau), in North America (Ferussac), France (Draparnaud), and to the north of Sweden (Nilson).

Mr. Morris has found it fossil in mammaliferous crag near London.

HELIX ROTUNDATA (The Radiated Snail). *Müller.*

Figures 71 and 72.

71.

72.

Probably better known in this country as the Zonites rotundatus of Gray and Macgillivry.

It was described as early as the year 1678, by Dr. Lister, under the name of Zonites radiatus.

A somewhat flat shell, being nearly similarly convex on either side; thin, but not fragile; deep striæ, semi-transparent, aperture small and lunate, umbilicus large and profound. There are from five to six and a half convolutions. Spire convex. The colour of the shell is reddish-grey, with streaks of a chesnut hue running from the centre.

Usual diameter a quarter of an inch.

The colour of the animal is blueish.

Common throughout Great Britain and Ireland, under stones and decayed wood, and occasionally in damp outhouses. The largest specimens from this neighbourhood were procured from the scullery at Highfield House, located in crevices between the wall and the stone floor.

There are two marked varieties:—The first with the spire quite flat, known as Helix Turtonii. The second colourless, or nearly so, transparent, and devoid of rays. The latter variety is rare.

M. Bouchard-Chautereaux remarks that they deposit from twenty to thirty eggs at a time, which are from thirteen to twenty days in hatching, becoming fully grown in a year. This great conchologist is in error with respect to the period at which they commence laying eggs, for on the 12th of March of the present year

[1852] I observed many specimens under decayed wood, some but just hatched and others a wee old; the eggs of these individuals must have been deposited as early as the middle of February.

It is a hardy shell, and may be found in open weather throughout the winter months.

In this neighbourhood it has been found abundantly at Highfield House, Bulwell, and Nottingham Castle.

It would be impossible to give a full list of the recorded British localities. The few now quoted will therefore suffice:—Penzance (Millett), Bristol (Miller), Wilts, Kent, and Dorset (Montagu), Essex (Sheppard), Bath (The Author), London (Grey), Dinton, Bucks. (Goodall), Battersea (Jeffreys), Norwich (Bridgman), Swansea (Jeffreys), Harlston, Norfolk, and Calke Abbey, Derbyshire (Bloxam), Grantham (The Author), Chaigeley, Lancashire (Winstanley), Newcastle (Alder), Lytham (The Author), Preston (The Author).

Scotland (Laskey), Dublin (Brown), County Down and County Antrim (Thompson), Isle of Man (Forbes), St. Mary's Island, Scilly (Millett).

On the Continent, in Sicily (Philippi), Germany (Pfeiffer), extending to the north of Sweden (Nilson), and in France (Draparnaud).

HELIX PYGMÆA (The Pygmy Snail). *Draparnaud*.

Figures 73 and 74.

74.

73.

This most minute shell is the smallest of the British Helices. Somewhat convex in form; semi-transparent; four convolutions; aperture, which is very small, semi-lunar; umbilicus large. Colour pale brown.

Diameter less than one line,

It is found in ditches and moist places, amongst dead leaves and at the roots of rushes. Probably it is a common shell, yet frequently overlooked, owing to its minuteness.

This interesting shell was added by Mr. J. E. Grey, of the British Museum, in 1821, and described in the *Medical Repository.*

Specimens received from Mr. Bean, of Scarborough, and Mr. Alder, of Newcastle, do not vary from those found in this neighbourhood.

It appears to be rare near Nottingham, hitherto being only found sparingly at Highfield House and Stanton-on-the-Wolds.

Other localities are—Landsend (Millett), North Devon (Miller), Clare, in Suffolk, and Devizes, Wilts. (Brown), Essex (Sheppard), London (Grey), St. Faiths, near Norwich (Bridgman), Tor Abbey Wood (Goodall), Marino, near Swansea (Jeffreys), Scarborough (Bean), Lytham (The Author), Newcastle (Alder), Wylam and Twizel House, Northumberland (Brown), Kendal (Gough).

Belfast (Hyndeman), Down, Antrim, Clare, and Queen's Counties (Thompson).

Rosslyn Glen, County of Midlothian (Brown), Ballantrae, Ayrshire (Thompson).

Found in Germany (Pfeiffer), France (Draparnaud) and even to the north of Sweden (Nilson).

Not found fossil.

We have now concluded the description of the Helix family.

Nottinghamshire, it will be observed, is deficient of some of the largest, the most beautiful, and most curious of this branch of British shells, viz.:—

Helix pomatia. The largest British land shell. It is confined to the south of England.

Helix aperta. Confined to Guernsey, where it is very rare.

Helix cantiana.

Helix carthusiana. Only found in Kent and Surrey.

Helix pisana. Only found in Cornwall, South Wales, and in the south east of Ireland.

Helix obvoluta. A Hampshire shell.

Helix lapicida. In limestone and chalk districts.

Helix rufescens. Generally distributed.

Helix lamellata. Chiefly in the north of England.

Helix fusca.

Helix umbilicata.

Of these it is possible that some of the five last-named species may yet be added to the shells of this neighbourhood, but any of the others it is hopeless to expect to discover.

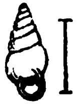
Bulimus.

This class of land snails have produced spiral tapering shells, differing much from the Helix family. The Bulimi are not polished; the aperture and columella is entire.

The general appearance of the animal resembles that of the Helices.

Bulimus obscurus [The Dusky Twist Shell]. *Müller.*
Figure 75.

75.



Of the division *Bulimus* Nottinghamshire appears to boast of but one species, that which is now about to be described. It was first described by Boys, in 1784, in "*Walker's Minute Shells.*"

The spire consists of six or seven raised whorls, which are faintly longitudinally striate. Semi transparent; aperture somewhat oval, with a milky-white reflected margin. The shell is brown in colour.

Usual length half an inch. Breadth two lines.

The colour of the animal is dark grey.

Found on old walls, under stones, and in woods, under moss on trees.

M. B. Chautereaux informs us that Bulimus obscurus deposits eggs from May until September; twelve to fifteen in number at a time, which hatch in fifteen days, and are thirteen months in arriving at maturity. The eggs, which are large, are roundish-oval in form. They are opaque, and isolated.

The young of this species are difficult to find, owing to the epidermis resembling the soil or bark on which it may happen to be located, as the case may be.

When crawling the shell is carried at an angle of 50

In this neighbourhood it is found abundantly at Highfield House and the Nottingham Castle yard. It has not been observed elsewhere.

Other recorded localities of this common and generally distributed shell are—London (Grey), Kent and Dorset (Montagu), Bristol (Miller), Wiltshire (Montagu), Essex (Sheppard), Hayle, Cornwall (Millett), Thorpe and Whitlingham Wood, near Norwich (Bridgman), Calke Abbey, Derbyshire (Bloxam), Kendal (Gough), Sunderland (Brown), and Newcastle (Alder).

In Ireland, at Dublin (Brown), Woodlands, near Dublin (Ball), Clonoony Barracks, King's County (Brown), La Bergerie, Portarlington (Clarke), Laore, County Antrim (Harvey).

In Scotland (Laskey), and East Lomond Hill, Fifeshire (Brown).

On the Continent Pfeiffer describes it as a German shell, Nilson as a Swedish species, and Draparnaud as a French shell.

The Bulimi of which this neighbourhood is deficient are:—

Bulimus acutus. A local but widely distributed shell, more particularly abundant near the sea.

Bulimus lackhamensis. Rare. Found in the south of England.

Pupa.

The *chrysalis shell* is small, spiral, but not tapering, the apex ending abruptly Lip reflected, Mostly the mouth provided with teeth, and semi-oval in form.

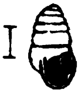
The Pupæ are all land shells, found in the neighbourhood of rocks and old walls.

The animal is short, has four tentacles, the lower pair being small, and in some species almost invisible. Owing to the minuteness of the lower tentacles in some species, they were overlooked, and these species described as having only two tentacles, and the name Vertigo was applied to them.

PUPA UMBILICATA [The Umbilicated Chrysalis Shell].
Draparnaud.

Figure 76.

76.



Cylindrical in form; smooth; peristome broad and reflexed. Colour pale brown. Semi-transparent, thin, apex abrupt, aperture lunate. A single tooth. From five to seven convolutions.

Usual length a ninth of an inch; breadth a twentieth of an inch.

Mr. Joshua Alder, of Newcastle, found it to be vivaporous, having extracted the young with the first whorl of the shell formed within the parent shell.

The colour of the animal is blue.

First described by Dr. Lister, in the year 1678.

A very common species, procured in cracks of old walls, under stones and the bark of trees, amongst moss and ivy, in hedges and sand banks. Occurring not only in valleys and near the sea shore, but also upon mountains.

In this neighbourhood it is abundant at Nottingham Castle and Highfield House.

A few examples will suffice to show its wide range:-- Penzance (Millett), Bristol (Miller), Wiltshire, Dorsetshire, and Kent (Montagu), Essex (Sheppard), Norwich (Bridgman), London (Grey), Calke Abbey, Derbyshire (Bloxam), Chaigeley Manor, Lancashire (Winstanley), Kendal (Gough), Newcastle (Alder).

Scotland (Fleming), Ireland (Brown), Isle of Man (Forbes).

Abroad, it is found in France (Draparnaud), throughout Europe and in the north of Africa (Forbes).

PUPA PYGMŒA [The Pygmy Chrysalis Shell]. Figure 77.

77.

This shell is better known as the Vertigo pygmœa of Ferussac, Turton, Grey, Thompson, Brown, &c. It was added to our British species by Mr. J. G. Jeffreys, of Norton House, Swansea, in the year 1829, and described by that conchologist in the "Transactions" of the Linnean Society.

It is dextral, almost smooth, polished, has five convolutions, the mouth somewhat semi-oval, furnished with four and often five teeth. The outer lip folded backwards; colour, reddish-brown. The shell is nearly egg-shaped.

Exceedingly minute, not more than one line in length.

Animal, dark grey colour.

here is a variety called Pupa alpestris, which is paler in colour, more shining, more elongated, and having only four teeth, which are not so wide as in the more permanent form of Pupa pygmœa.

Found on barren hills, under stones, in stone walls, &c.

Mr. Jeffreys has sent specimens from Swansea, Mr. Alder others from Newcastle, and Mr. Gough others from Kendal. They all differ from those found in this neighbourhood, our specimens partaking of a character midway between P. pygmœa and P. pygmœa var. alpestris.

Hitherto, in the county of Nottingham, it has only been noticed at Highfield House, and even there not abundantly.

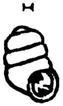
Other localities are—Wiltshire (Montagu), Swansea and Bristol (Jeffreys), London (Grey), Norwich (Bridgman), Newcastle-upon-Tyne (Alder), Cumberland and Northumberland, (Forbes), Kendal (Gough), Rawleigh House (Mrs. Barber), Belfast (Thompson), Douglas, Isle of Man (Forbes),

France (Draparnaud), Germany (Pfeiffer), Sweden (Nilson).

PUPA SUBSTRIATA [The Six-toothed Crysalis Shell].

Jeffreys.

Figure 78,



78.

This very diminutive shell, known in Grey's edition of "Turton's Shells" as Vertigo substriata, is cylindrical, shining, polished, and longitudinally striated, There are four and a half rounded convolutions. The apex blunt. Aperture provided with six teeth, two of which are indistinctly visible.

Length, one line; breadth, half a line.

The colour of the animal is dark grey.

A rare and local species, inhabiting wet moss

A single specimen only has been found in this neighbourhood, amongst wet moss at the edge of the lake at Highfield House.

There are but few recorded localities of this shell. The following may be enumerated:—Cornwall, Devon, and Suffolk (Brown), Barnstaple (J. G. Jeffreys), St. Faith's, near Norwich, rare (W. K. Bridgman), Preston (Kenyon), Yorkshire, Northumberland, and Westmorland (E. Forbes), London (Grey), Bristol and Wiltshire (Montagu), Kendal, rare (T. Gough), Newcastle (J, Alder), Ayreshire and widely distributed in Ireland (The late W. Thompson).

On the Continent, found in Germany (Pfeiffer).

Specimens have been received from Newcastle from Mr. Alder, Cockermouth from Mr. Fletcher, and Barnstaple from Mr. Jeffreys. One example, of course, is not sufficient for comparison.

We are very deficient in British Pupa's, only three having as yet been found out of the eleven species. The Nottinghamshire desiderata are:—

PUPA MUSCORUM. [Pupa marginata of Grey.] A widely spread species.

PUPA ANGLICA. Not abundant.

PUPA SECALE. [Pupa juniperi of Grey.] A local species, and the largest of the British Pupa's.

PUPA EDENTULA. [Vertigo edentula of Grey.] A local but widely spread species.

PUPA MINUTISSIMA. [Vertigo cylindrica of Grey.] Very rare.

PUPA ANTIVERTIGO. [Vertigo palustris of Grey.] Local.

PUPA PUSILLA. [Vertigo pusilla of Grey.] Local.

PUPA VENETZII. [Vertigo augustior of Grey.] Rare.

BALEA.

Spiral tapering shells, with many convolutions. Aperture somewhat egg-shaped, and left-handed. It has much the appearance of a Clausilia, but does not possess the clausilium of that family.

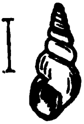
The animal resembles a Bulimus.

BALEA FRAGILIS [The Fragile Moss Shell].

Draparnaud.

Figure 79.

79.



This shell is known under various names; it is the Turbo perversus of Turton, the Pupa fragilis of Draparnaud, the Clausilia fragilis of Pfeiffer, the Clausilia perversa of Charpentier, the Odostomia perversa of Fleming, the Balœa perversa of Grey, the Balea perversa of Macgilivray, and the Balea fragilis of Sowerby.

It is small, thin, delicate, shining, somewhat transparent, elongated, tapering to a point, striated longitudinally, thin peristome, slight umbilicus, mouth pear-shaped, outer lip slightly arcuated. Yellowish horn-coloured. It has from six to nine convolutions.

The usual length is a third of an inch. Professor Forbes remarks that large specimens attain a length of five lines. I have never found any exceeding four lines.

The colour of the animal is grey, being striped with a darker hue. Upper tentacles long; lower ones very short.

A widely spread species.

Balea fragilis is occasionally confused with immature specimens of Clausilia nigricans, from which it does not differ very much.

Found on trunks of trees in moss and under the bark, in walls, under stones, and on the ground amongst lichens, especially Peltidea canina.

Dr. Lister first described this species in the year 1678.

In this neighbourhood it is rare, solitary individuals having been found at Wollaton, Bulwell, Thrumpton, and Highfield House.

More distant localities are numerous, amongst which may be mentioned Penzance, Cornwall (Millett), Devonshire, Dorsetshire, and Kent (Montagu), Essex (Sheppard), Suffolk (Paget), Norfolk (Bloxam), South Wales (Jeffreys), Norwich (Bridgman), London (Grey), Chaigeley, rare (Winstanley), Preston (Kenyon), Reeth, near Richmond, Yorkshire, amongst moss on walls, large and abundant (A. S. H. Lowe), Kendal, especially near Lake Windermere (Gough), Newcastle (Alder).

Scotland (Fleming), Ireland (Thompson), Isle of Man (Forbes), and Scilly Islands (Millett).

On the Continent, in France (Draparnaud), in Germany (Pfeiffer), and in Sweden (Nilson).

M. B. Chautereaux remarks the eggs are deposited between July and October, from twelve to fifteen at a time; these are hatched in from fifteen to twenty days, and are fully grown in a year.

This is the only British species.

CLAUSILIA.

Singular land shells, of a produced spiral form. Mouth provided with teeth, and having within the throat an elastic testaceous valve, which closes when the animal retires within it, as a *trap-door*.

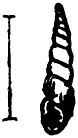
The animal is broad, but not long; has four tentacles, the lower pair of which are very short.

CLAUSILIA NIGRICANS [The Dark Close Shell].

Maton and Rackett.

Figure 80.

80.



The common Clausilia, as it is usually called, was first described by Dr. Lister, in the year 1678. Although a generally distributed species throughout Great Britain, yet it is but little known, save to the conchologist, its habits and colour rendering it an object easily to be passed over. It is the only species of this interesting family found in this neighbourhood.

Long, narrow, and spiral; slender, yet strong; shining; aperture nearly oval; peristome white, and scarcely reflexed. Colour, deep brown. The shell is covered with raised striæ, placed longitudinally. There are from seven to eleven convolutions. The animal is not operculated, but in place of this appendage it is provided with an elastic valve for its protection when retired within the shell.

Diameter half an inch [from the extremity of the aperture to the apex of the shell].

Colour of the animal dark grey.

A very distinct variety [which was considered by Draparnaud, Alder, and Grey to be a different species, and named by them *Clausilia dubia*] is occasionally found, but not hitherto in this neighbourhood. It attains a greater size, is more tumid, and pale brown in colour. Professor Forbes, in his *British Mollusca*, has recorded it as only a variety of the Clausilia nigricans.

Another variety [*Clausilia parvula* of Leach, Turton, and Jeffreys] is smaller and more delicate; and a third variety [*Clausilia Everettii* of Miller] has a less number of convolutions, and is shorter in length.

Neither of the latter named varieties differ so much as that of C. dubia.

An inhabitant of old walls, and sometimes old trees.

Specimens sent from Newcastle by Mr. Alder. and Penzance by Mr. Millett, did not vary from those found in this neighbourhood.

Our localities are Stanton-on-the-Wolds, Bulwell, Thrumpton, and Highfield House.

Other recorded ones are Penzance (Millett), Dorsetshire, Wiltshire, and Kent (Montagu), Bristol (Miller), Essex (Sheppard), Norwich (Bridgman), Dinton Hall, Bucks. (Goodall), Hartwell, Bucks. (Horton), London (Grey), Calke Abbey, Derbyshire (Bloxam), Heights of braham, at Matlock (R. Enfield), Chaigeley Manor, Lancashire (Winstanley), Lytham, Lancashire (The Author), Kendal (Gough), Newcastle (Alder).

Dublin (Brown), Belfast (Thompson), common in Ireland (Forbes), Isle of Man (Forbes).

On the Continent, found in France (Draparnaud), Germany (Pfeiffer), Corsica (Payradeau), and Sweden (Nilson).

We are deficient of:—

Clausilia laminata [the Clausilia bidens of Draparnaud, Fleming, Grey, Brown, Lamark, &c.]. Chiefly a southern shell, although found in Northumberland.

Clausilia plicatula. A southern shell.

Clausilia biplicata [the Clausilia Rolphii of Grey, Turton, and Brown]. A southern species.

ZUA.

A pretty, shining, very smooth, spiral, land shell Aperture ovate, and peristome thickened.

The animal very similar to that of the Helix.

Only one species belongs to Great Britain.

Zua lubrica [The Common Varnished Shell]. *Müller.* Figure 81.

81.

Discovered by Dr. Lister, in the year 1678.

This pretty and very common British land shell is spiral, polished, very smooth, nearly transparent, and brownish-horn coloured; cylindrical-oblong in form, apex sunk and blunt, and small aperture, which is lanciolate-ovate in form. No umbilicus. There are six convolutions. Length, nearly a quarter of an inch.

The colour of the animal is a brilliant *lead-blue*.

Found under stones and fallen leaves, and amongst moss on lawns and in woods.

In this neighbourhood it has been found abundantly at Thrumpton, Sawley, Stanton-on-the-Wolds, Highfield House, Oxton, and Wollaton.

More distant places are, Hayle, Cornwall (Millett), Wiltshire, Dorsetshire, and Kent (Montagu), Bath (The Author), Bristol (Miller), Essex (Sheppard), London (Grey), Hartwell Park (The Rev. C. Lowndes), Stone, Buckinghamshire (The Rev. J. B. Reade), Norwich (Bridgman), Grantham (The Author), Helmsley Blackmore Castle, and Chaigeley (Winstanley), Lytham and Thornley, Lancashire (The Author), Kendal (Gough,) Darlington, Durham (J. Graham), Newcastle (Alder).

Scotland (Laskey), Ireland (Brown and Thompson), Isle of Man (Forbes).

France (Draparnaud, Germany (Pfeiffer), extending to the north of Sweden (Nilson), a very wide Continental range (Forbes).

Mr. Morris has found it fossil in mammaliferous crag near London.

AZECA.

To those not well acquainted with conchology this species may readily be mistaken for that of Zua; the form of the shell closely resembling Zua. The chief distinction lies in the mouth, which is ovate and provided with teeth, whereas in Zua it is toothless.

The animal is similar to a Zua.

Only one species is found in Great Britain.

AZECA TRIDENS [The Glossy Trident Shell]. *Pulteney.*
Figures 82 and 83.

82.

83.

This interesting species has been added on the authority of my brother, Mr. A. S. H. Lowe, who found several specimens near Highfield House. I have been less fortunate in my search for it, so that it doubtless is rare in this neighbourhood.

The shape somewhat resembles that of Zua lubrica; smooth, very polished; *reddish-horn* coloured; aperture small and narrow, provided with teeth. Seven or eight convolutions. Length, a quarter of an inch.

Colour of the animal, *dark-leaden.*

Described by Dr. Pulteney, in his "Catalogue of Dorsetshire Shells," about the year 1790.

A local species, and by no means common. It has never been found in Ireland.

Inhabits woods, under moss and stones.

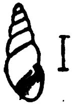
The recorded localities are but few:—Near the river Stour, in Dorsetshire (Pulteney), London (Grey), Matlock (The Author), Helmsley Blackmore Castle, and Chaigeley Manor, Lancashire (Winstanley), Kendal (Gough), Newcastle (Alder), Carolina Park, Edinburgh (Laskey).

Germany (Pfeiffer), and widely spread on the Continent (Forbes).

ACHATINA.

Spiral shell, with an elongated mouth. Only a single minute species is found in England. The animal is very like a Bulimus.

ACHATINA ACICULA [The Needle Agate Shell]. *Müller.*
Figure 84.



84.

This very interesting, minute, and extremely delicate shell is added on the authority of the Rev. J. Peach, some specimens having been shown to me as found near Ratcliffe, amongst moss.

A gradually tapering shell, with blunt apex; the body whorl very large comparatively, and aperture lanceolate. Having six convolutions.

The usual length is a fifth of an inch.

The colour of the animal is white.

First described by Boys, in 1784, in "*Walker's Minute Shells.*"

Inhabits roots of grass and moss, and is found in Saxon coffins. Dead examples seem to be more abundant than living specimens. Professor Forbes says that in many instances it is subfossil, and appears to have been common in England at the close of the tertiary epoch.

Specimens have been forwarded from Swansea by Mr. Jeffreys, from Belfast by the much lamented Professor Thompson, from Norwich by Mr. Bridman, from Weymouth by Mr. Damon, and from Stone by the Rev. J. B. Reade; the latter are remarkably fine examples.

The eggs are large.

Kent and Dorsetshire (Montagu), Bristol (Miller), London (Grey), Essex (Sheppard), Barham Downs, Kent, and Lackham, Wiltshire (Brown), in Saxon coffins in Yorkshire (Grey), in Saxon coffins at Stone, Buckinghamshire (Rev. J. B. Reade), Shotford Bridge. Norfolk, and Calke Abbey, Derbyshire (Bloxam), Thorpe, near Norwich (Bridgman), Kendal (Gough), Newcastle (Alder), Scotland (Fleming), Dublin, Queen's County, and Cork (Brown), Dromana, County Waterford (Miss M. Ball).

On the continent, in France (Draparnaud), Germany (Pfeiffer), Sicily (Philippi), Sweden (Nilson), widely spread on the continent (Forbes).

SUCCINEA.

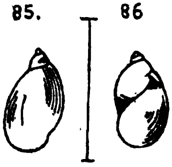
Egg-shaped, spiral, fragile, and semi-transparent shells. Aperture oblique; shell covered with an epidermis. Animal broad for its length, and having four tentacles..

Found on wet mud, and on the leaves and stems of water and bog plants.

SUCCINEA PUTRIS [The Common Amber Snail].

Linnæus

Figures 85 and 86.



Under this name Professor Forbes unites the *Succinea putris* and the *Succinea Pfeifferi* of Grey and Pfeiffer;

the latter named shell was, before the publication of the splendid work "The British Mollusca," considered as a distinct species, but is now described as a variety only, under the appellation of *var. gracilis.*

Having carefully examined these shells for some time, it is with some hesitation that I adopt Professor Forbes's combination, for the animal is so very different in size, colour, and habits. The animal of Succinea putris is pale *flesh-coloured,* while that of Succinea Pfeifferi is a *leaden-black ;* the former is double the size of the latter. The Succinea putris is chiefly found on the stems and leaves of water and bog plants, whilst the Succinea Pfeifferi is found on the mud at the edges of streams. It is not difficult to collect specimens of both these shells varying in such a manner that a gradual series may be obtained connecting the two species, but the same may be done with other species, such as the Pisidiums, and especially connecting in a gradual series Planorbis carinatus with Planorbis marginatus, Planorbis nitidus with Planorbis lacustris, Helix refescens with Helix hispida, Helix caperata with Helix virgata, Paludina Listerii with Paludina vivipara, Limnæus pereger with Limnæus auricularius, and Valvata cristata with Valvata piscinalis, yet all conchologists agree in pronouncing each a distinct species. It is, therefore, probable that Succinea putris may yet again be separated from the now so-called *var. gracilis.*

The form varies considerably, it is generally somewhat conical, nearly transparent, shining, very fragile, thin, smooth, and pale amber-coloured. The body whorl very large. There are three or three and a half convolutions.

The length is sometimes three-fourths of an inch.

First described by Dr. Lister, in the year 1678.

Inhabits damp places, on succulent plants near water.

It has only been found in this neighbourhood at Thrumpton and Sawley, and in the latter place but sparingly.

Other localities are, Thornley, Lancashire, where it is very small (The Author); Chaigeley Manor and Lytham, Lancashire, where it is small (The Author), Newcastle (Alder), Penwortham (Winstanley), near Repton and Calke Abbey, Derbyshire (Bloxam), Stone, Buckinghamshire (Reade), near Shotford Bridge, Northamptonshire (Bloxam), London (Grey), Ross, Herefordshire (Winstanley), Penzance, rather rare (Millett). Reeth, near Richmond, Yorkshire (A. S. H. Lowe).

Scilly Isles (Millett), Isle of Man (Forbes), France (Draparnaud), Sweden (Nilson), Germany (Pfeiffer), Ireland (Brown).

It is a widely spread species.

M. B. Chatereaux says Succinea putris lays from 50 to 70 eggs at one time, which hatch in a fortnight, and are fully grown in less than a year. The eggs, which are laid between May and September, are glassy in appearance, straw-coloured, and globose. They are attached in masses to plants and stones.

Mr. Morris has found it fossil in the mammaliferous crag near London.

VAR. GRACILIS [The Slender Amber Snail].

Better known as the Succinea Pfeifferi of Grey, and first described by Joshua Alder, Esq., in 1830. It is more slender and oblique, and the shell darker in colour than Succinea putris. It is mostly of a *reddish-amber*. Apex very small, seldom more than three convolutions. The mouth longer and straighter than Succinea putris. The colour of the animal is *leaden-black*.

Found crawling on mud, at the sides of ditches and streams. It is singular that neither this nor Succinea putris is found in water, although always in the neighbourhood of it; and even when placed in water it cannot be readily drowned.

In Nottinghamshire, found at Beeston, Highfield House, Radford Grove, Stanton-on-the-Wolds, Bulwell, Wollaton, and Sawley.

There are several varieties, too indistinct in character to be described.

We are deficient of the only other British species, Succinea oblonga, which is a rare shell. It is found near Swansea, Glasgow, and in Berwickshire.

LIMNŒADÆ.

A numerous family of fresh-water snails, having short stout heads, with a pair of tentacles, which are usually large and triangular in form.

The branches of this family are pulmoniferous.

The form of the shell varies from spiral to even patelliform.

An inhabitant chiefly of still and slow streams, becoming less abundant and at the same time smaller in size in the more rapid currents.

The eggs are deposited within a pellucid mass of a gelatinous substance, and are secured to stones or submerged leaves and stems of aquatic plants.

PHYSA.

Fragile, spiral, smooth, shining, lengthened or globose shells.

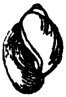
The animal possesses two lengthy tentacles. The foot is lanceolate.

Professor Forbes remarks, in the *British Mollusca*, that fossil Physœ, closely resembling our present species, are abundant in Dorsetshire, in the Purbeck strata.

PHYSA FONTINALIS [The Stream Bubble Shell].

Linnæus.

Figure 87.



87.

Physa fortinalis is the Bulla fontinalis of Linnæus. It is usually ovate, with a short spire, ending in an abrupt and blunt apex. Nearly pellucid, shining, very thin, and fragile. Colour *amber* to *pale horn.* There are four to five convex convolutions, the body whorl occupying nearly the whole of the shell. Aperture large, with the edge not reflexed. The pillar white.

First described by Lister, in the year 1678.

There are several varieties of this shell, very distinct; it is possible that it may yet be divided into three species. Of these one variety is rare: the spire is considerably more produced. I have never met with it.

Another variety, *acuta*, is procured in one locality, near Lenton. It has several marked characters, so distinct from the ordinary form of Physa fontinalis that it is difficult to acknowledge it *as merely a variety.* In the first place it is considerably larger, being 5¼ lines, whilst the other form does not exceed 3½ lines. In the second place the body whorl is more tumid, there are five convolutions, and the spire is produced; whilst in the ordinary form there are but four convolutions, and the spire scarcely elevated above the body whorl. In the third place the colour is that of very pale horn with a broad white band, whilst in the ordinary form it is amber-coloured and devoid of this white band. Some authors have tried to explain this difference to situation, stating that the one form is found in plashes of water, whilst the other is in deeper water. This explanation, however, is not bourn out by investigation. The form *acuta* is found in a clear deep brook, amongst water plants, in which the other form of Physa fontinalis is also found associated with it. The latter form is an inhabitant of the Trent, clear brooks, and stagnant ditches. There is another peculiarity in the *acuta*, it has a more acute tail, and tosses its shell about repeatedly in an extraordinary manner, as if it would throw it away. Some conchologists who have noticed this fact consider it to be infested by a minute worm, known as the *Gordius inquitinus* of Müller.

The colour of the animal is greyish, and the mantle edge is reflected over the shell.

An abundant and generally diffused species, inhabiting ponds, ditches, rivers, and lakes, on aquatic vegetation.

M. Bouchard Chautereaux says it deposits from three to ten eggs at a time, which are hatched in 16 days.

The localities in this neighbourhood in which this shell have been found abundantly are, dikes in Lenton, Beeston, Radford, and Oxton, the Musco-sic dike, the dike below Broad-gate, ponds at Wollaton, and amongst algæ and confervæ in the Trent between Beeston and Sawley.

More distant localities are—Bristol (Miller), Wiltshire (Montagu), Essex (Sheppard), Norfolk, and Shotford Bridge, Northamptonshire (Bloxam), Hartwell Park, near Aylesbury (Lowndes), Stone, Buckinghamshire (Reade), Norwich (Bridgman), London (Grey), Anglesea (Sowerby). Chaigeley, near Clitheroe (Winstanley), Kendal (Gough), Newcastle (Alder), Dublin and King's County (Brown), and a variety on Monavallach Mountain, near Kilmacthomas, Waterford (Leach). Isle of Man (Forbes).

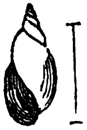
On the continent, in France (Draparnaud), Germany (Pfeiffer), and Sweden (Nilson).

PHYSA HYPNORUM [The Slender Bubble Shell].

Linnæus.

Figure 88.

88.



This shell, which was discovered by Petiver, at Mitcham, in Surrey, is the Bulla hypnorum of Linnæus, Montagu, and Turton, and the Aplexus hypnorum of Grey.

It is an elegant shell, of a lengthened conical form, with a produced but blunt apex. Polished, thin, fragile, yellowish-horn coloured. Aperture of a lanceolate ovate form. Five produced and scarcely raised convolutions.

The usual length is half an inch, and breadth 2½ lines.

I have taken specimens from a ditch at Blackpool five-eighths of an inch long by three lines broad, and Montagu remarks that he found some three-quarters of an inch long.

The colour of the animal is nearly black.

M. Bouchard Chantereaux says it lays from three to twelve eggs, which hatch in 16 days.

A widely diffused but exceedingly local shell, inhabiting slow streams and plashes of water, especially the latter.

The places where it is obtained in this neighbourhood are—ditches of clear water in the gardens close to the river Leen in the Nottingham Park, another in a field at Beeston, and a third below the Railway Station at Beeston.

More distant ones are—Fremington House, Devonshire, where it grows to a large size (Jeffreys), Bristol (Miller), Wiltshire (Montagu), Essex (Sheppard), Mitcham, Surrey (Petiver), London (Grey), Ross, Herefordshire, Ormskirk, and Chaigeley Manor, Lancashire (Winstanley), Blackpool (The Author), Newcastle (Alder), &c. In the south and midland counties of Scotland (Forbes). Ireland (Brown).

In France (Draparnaud), in Sweden (Nilson), in Germany (Pfeiffer), and if the Physa elongata of Say proves to be a variety of this species, it will be in America (Say).

I am not aware that it has ever been found fossil.

PLANORBIS.

The members of this somewhat numerous family of discoidal shells bear a striking resemblance in general form to the Ammonites of the ancient world, they are however inferior in size to most of the members of that exceedingly interesting though extinct race.

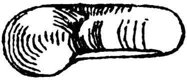
They are spiral, with a dextral mouth, which is semilunate, or elliptic, and entire.

The animal possesses a broad head, with a pair of long tentacles, the eyes being [as in other branches of Limnœade] placed at their inner bases.

An aquatic race, feeding upon water plants.

PLANORBIS CORNEUS [The Horny Coil Shell]. *Linnæus.*

Figures 89 and 90.



89.

90.

Described by Lister, in 1678.

This species is the king of the Planorbis tribe, being larger than any other in the waters of Great Britain. It is thick, strong, nearly three times as broad as it is high, and has five deeply divided ventricose convolutions. The lower disc is flat, and the upper disc concave. The shell has minute spiral striæ. Aperture large and of a rounded lunate form. Umbilicus deep. Colour of the shell browish-olive.

Large examples are an inch in diameter, by four and a half lines thick.

In a muddy brook at the foot of Beeston, into which a constant supply of warm water is discharged, this species grows to a large size, being an inch and a line in diameter.

The animal is nearly black.

Locally abundant in canals, ditches, ponds, and gentle streams, where there is plenty of mud and vegetable decomposition.

A white variety occurs near London, according to Professor Forbes.

The animal has the power of discharging a purple fluid when irritated.

It is a species which will live and thrive in confinement.

In the introduction of this work [page 5] it was stated, as an illustration of the length of time which this species would keep alive out of water, that specimens survived after being away from their native element a month. Subsequently the same individuals were placed on a wall, receiving the direct rays of a summer sun for six consecutive weeks, and survived.

M. Bouchard Chautereaux says they lay from 20 to 40 eggs at one time, which hatch in about 16 days.

In this neighbourhood it is abundant in the several localities where it is found. These are a brook at Lenton, another above Beeston Ryelands, a third at Beeston, and the Musco-sic brook east of Beeston.

Other recorded localities:—-Weston Supermare (Hincks), London (Grey), River Thames, Battersea (Forbes), Essex (Sheppard), Norwich (Bridgman), River Waveney, near Shotford Bridge, Northamptonshire (Bloxam), River Eythrope, at Stone, Buckinghamshire (Reade), Darlington (Alder).

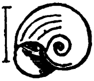
In Ireland, in Queen's County (Rev. B. J. Clark), Maynooth and Dublin (Capt. Brown), and Naas (Dr. Ball). Not Found in Scotland (Forbes).

In France (Draparnaud), Germany (Pfeiffer), Sweden (Nilson.

Found fossil in mammaliferous crag on the banks of the Thames, near London (Morris).

Planorbis albus [The White Coil Shell]. *Müller*.

Figure 91.



91a

Described by Petiver, in his "*Gazophylacium*."

It has four to five rounded and deeply divided convolutions, marked with strong longitudinal striœ and deciduous bristles. Both discs are convex. Thin, fragile, pale horn-coloured, with a large and nearly white aperture, of an oboval-lunate form.

Diameter usually from a fourth to a fifth of an inch. The specimens from Scarborough measure three and a half lines in diameter; those from Highfield House three lines; whilst those from Penzance do not exceed two lines and a half.

Animal usually grey, but very varied in different localities.

A common species throughout Great Britain and Ireland; found in stagnant water and slow streams, feeding upon Nuphar lutea, such water plants as *Potamogeton*, and decaying leaves.

M. Bouchaud Chautereaux says it lays from ten to thirteen eggs, which hatch in twelve days.

The variety *glaber*, of Jeffreys, is *without striæ.*

Specimens have been received from Dilston, sent by Mr. Alder, from Scarborough by Mr. Bean, and from Penzance by Mr. Millett. Those from Scarborough are freer from striæ and not so broad as those found in this neighbourhood.

Our habitations of this shell are the lake at Highfield House, a clear brook at Radford, another at Oxton and the river Trent on *algæ*, near Beeston Ryelands, where it is rare.

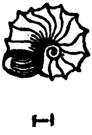
Other localities are—Penzance (Millett), Bristol (Miller), Wiltshire (Montagu), Swansea (Bate), Norwich, scarce (Bridgman), London (Grey), Essex (Sheppard), Battersea (Jeffreys), Stone, Buckinghamshire (Reade), Kendal (Gough), Blackpool, scarce (The Author), Newcastle (Alder).

Scotland (Laskey), Ireland (Brown), Isle of Man (Forbes), Germany (Pfeiffer), and Sweden (Nilson).

PLANORBIS NAUTILEUS [The Nautilus Coil Shell]. *Linnæus.*

Figure 92.

92.



Better known as the *Planorbis imbricatus* of Grey, Draparnaud, Müller, Turton, Lamark, Pfeiffer, Brown, Braid, &c. It was first described by Boys, in the year 1784.

A delicate, minute, depressed, horn-coloured shell, often covered with a black incrustation. Upper disc flat, lower disc convex. Aperture ovate and entire. There are three convolutions, the outer edge of the body whorl being mostly imbricated with membraneous ridges. Diameter of the shell from an eighth to a tenth of an inch.

The colour of the animal is *light grey*.

Variety *cristatus* of Draparnaud is smaller, and the transverse laminœ are wider.

It lays six eggs (Chautereaux).

A widely spread mollusc, found upon aquatic plants and decayed leaves in ponds and ditches.

Specimens sent by Mr. Bean from Scarborough and by Mr. Jeffreys from Swansea did not differ from those procured here.

It is found in the lake at Highfield House, and in a marl-pit at Stanton-on-the-Wolds; in neither place abundant.

Other recorded localities are—Penzance (Millett), Dorsetshire, Wiltshire, and Kent (Montagu), Bristol (Miller), Essex (Sheppard), Norwich, rare (Bridgman), London (Grey), Scarborough (Bean), Lytham, rare (The Author), Kendal (Gough), Newcastle (Alder).

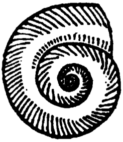
In the south and middle of Scotland (Forbes), Aberdeen (Macgillivray), Ireland (Brown), Isle of Man, rare (Forbes).

On the continent, in France (Draparnaud), in Germany (Pfeiffer), and in Sweden (Nilson).

Found fossil in the mammaliferous crag near London (Morris).

Planorbis marginatus [The Margined Coil Shell]. *Draparnaud.*

Figure 93.



93.

Described by Lister, in 1678.

Very similar in general appearance to Planorbis carinatus, but not so much compressed, semi-transparent, and unpolished. Wrinkled; carinated; colour brownish, but mostly enveloped in a black coating Lower disc flat, upper disc concave. There are five well separated convolutions. In Planorbis carinatus the body whorl is very large in comparison with the preceding whorl; there is not so great a difference in this respect in Planorbis marginatus. Aperture quadrant shaped.

Specimens five-eighths of an inch in diameter are considered large. In this neighbourhood examples have been dredged measuring as much as eight lines and a half in diameter.

Animal, *black*.

Var. *rhombeus*. The keel is considerably less, the gyrations closer, the lower disc very hollow in the centre, and the upper disc less concave.

Var. *Draparnaldi*. Keel more central. Smaller.

An abundant species, amongst water plants in stagnant pools and slow rivers.

Lays six eggs at one time (Chautereaux).

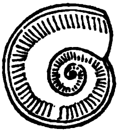
Localities in Nottinghamshire—Musco-sic dike, small pools and brooks in Lenton, Beeston, Beeston Ryelands, and Radford.

Amongst the many other localities may be mentioned Essex (Sheppard), London (Grey), River Thames, at Guilford (Millett), River Waveney, near Shotford Bridge, Northamptonshire (Bloxam), River Eythrope, at Stone, Buckinghamshire (Reade), Norwich (Bridgman), Kendal (Gough), Newcastle (Alder). Ireland (Thompson). Scotland (Fleming).

Widely distributed on the continent (Forbes), France (Draparnaud), Germany (Pfeifier), and Sweden (Nilson).

PLANORBIS CARINATUS [The Carinated Coil Shell]. *Müller.*

Figure 94.



94.

First discribed by Montagu, in 1803.

A nearly smooth, well polished, shining, semi-transparent shell, with five well divided and rapidly enlarging convolutions. The outer edge of the body whorl is furnished with an obtuse keel. Lower disc flat, upper disc profoundly concave in the middle, and forming an umbilicus. Horn-coloured. Aperture rhomboidal, and angulated laterally.

Usual breadth half an inch. Individuals in this neighbourhood rather exceed this size.

Colour of the animal, *brownish*.

In the variety *disciformis* the centre of the lower disc is nearly convex.

A local but widely dispersed shell, inhabiting stagnant water and slow streams.

Lays six eggs (Chantereaux).

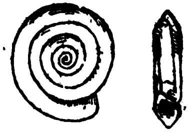
In this neighbourhood it is procured rather plentifully in the Musco-sic dike, and others at Beeston and Lenton, in the Trent above Beeston Rylands, in the Leen at Lenton, under the Seven Arches in the Nottingham Meadows, and in a stream at Radford Grove.

It is procured at Bristol (Miller), in Wiltshire (Montagu), Essex (Sheppard), London (Grey), Norwich (Bridgman), River Waveney, near Shotford Bridge, Northamptonshire (Bloxam), River Eythrope, Stone, Buckinghamshire (Reade), Mill-pond, Ross, Herefordshire (Winstanley), Kendal (Gough), Darlington, Durham (Graham). Widely spread, but local, in Ireland (Thompson). It is not found in Scotland.

On the continent, in France (Draparnaud), in Germany (Pfeiffer), and in Sweden (Nilson).

Mr. Morris has found it fossil near London.

Planorbis vortex [The Whorl Coil Shell]. *Linnæus.*
Figures 95 and 96.



95. 96.

This very depressed, many whorled, common shell, was first described by Lister, in 1668. It is shining, fragile, pellucid, and horn-coloured. Upper disc deeply concave, lower disc flat. There are six to seven narrow, deeply divided convolutions, the body whorl of which is very little larger than the preceding one. Aperture oblique and angulated.

Usual diameter from three to four lines; it occasionally reaches five lines near Nottingham and in the vale of Aylesbury. It is very small and poor, both at Penzance and Kendal.

Animal *grey*, with a *leaden-black* head.

An inhabitant of stagnant water and slow streams. Can be kept a considerable time out of water, for in its ordinary localities, small ditches and swamps, the summer's sun dries them up, leaving the shell without water. On these occasions the aperture is closed with a white *epiphragm*, and the animal remains dormant until rainy weather re-fills the ditches.

Procured plentifully in dikes in the parishes of Beeston, Attenborough, Radford, Bulwell, and Stanton-on-the-Wolds, the Trent at Beeston, the Leen at Bulwell, under the Seven Arches in Nottingham Meadows, and in the lake at Highfield House.

A few distant localities will suffice to illustrate its wide range:—Penzance (Millett), Bristol (Miller), Wiltshire (Montagu), Essex (Sheppard), London (Grey), Northamptonshire and Derbyshire (Bloxam)' Hartwell Park, Buckinghamshire (Lowndes), Stone, Buckinghamshire (Reade), Norwich (Bridgman), Kendal, one locality (Gough), Dumfrieshire (Sir W. Jardine), Aberdeen (Macgillivray),

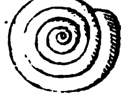
Ireland (Thompson), Scilly Islands (Millett). France (Draparnaud), Germany (Pfeiffer), Sweden (Nilson).

Found fossil near Londen (Morris)

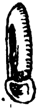
Planorbis spirorbis [The Rolied Coil Shell].
Müller.

Figures 97 and 98.

97.



98.



Described by Dr. Pulteney, about 1790, in his *Catalogue of Dorsetshire Shells.*

Bears a strong resemblance to Planorbis vortex, so much so that much confusion occurs when the distinctive differences are not known. The two discs are concave, semi-transparent, but often coated with a black incrustation. Body whorl not much larger than the preceding one. There are six convolutions. Not so thin as Planorbis vortex. The form of the aperture is so marked a feature that it can at once be recognised from Planorbis vortex, it is almost round.

Usual diameter a quarter of an inch. Specimens have been obtained here four lines in diameter.

Some writers on British conchology describe it as a widely spread abundant species, even more so than Planorbis vortex. In this county it seems anything but abundant.

Inhabits ponds, canals, ditches and marshes.

Our localities are—a ditch below the Railway Station at Beeston, a wet meadow at Stanton-on-the-Wolds, and the bogs at Bulwell.

More distantly at Bristol (Miller), Wiltshire (Montagu), Essex (Sheppard), London (Grey), Norwich (Bridgman), River Eythrope, at Stone, Buckinghamshire (Reade), Kendal, one locality (Gough), Newcastle (Alder). In Ireland, widely spread (Thompson), Scotland, widely spread (Forbes), Livingstone, Wes Lothian (Fleming), Isle of Man, rare (Forbes).

On the continent, in France (Draparnaud), in Germany (Pfeiffer), and in Sweden (Nilson).

This species can live even longer out of its native element than Planorbis vortex.

PLANORBIS CONTORTUS [The Twisted Coil Shell].

Linnæus.

Figures 99 and 100.

99.

100.

First described by Petiver.

A dull looking horn-coloured shell, having the upper disc flat, and the lower disc deeply sunk in the middle, so as to form a profound umbilicus. There are from five to six very narrow convolutions, the body whorl being scarcely larger than the preceding one. Aperture lunate, and very small. The shell is very deep for its diameter, the difference in length and width being rather more than as two to one. Suture deep.

Average diameter a fifth of an inch, and average height one line. The largest specimens, sent from Stone by the Rev. J. B. Reade, and those found by myself at Lytham, measured fully two lines and a half by more than one line high.

The colour of the animal is somewhat *leaden.*

A somewhat common shell, inhabiting ditches, ponds, and slow streams.

M. Bouchard Chautereaux says it lays from six to eight eggs at one time, which are hatched in from ten to twelve days.

Our localities are a stream at Radford Grove, Bulwell bogs, the River Leen at Bulwell (rare), and a ditch at Lenton (rare).

Further removed, at Bristol (Miller), Lackham, in Wiltshire (Montagu), Essex (Sheppard), Isle of Purbeck, near Wareham, and Charmouth, Dorsetshire (Montagu), Spetisbury, Dorsetshire (Rackett), London (Alder), Norwich (Bridgman), River Waveney, near Shotford Bridge, Northamptonshire (Bloxam), River Eythrope, at Stone, Buckinghamshire (Reade), Scarborough (Bean), Lytham (The Author), Kendal (Gough), Newcastle (Alder), Edinburgh, and Cupar, Fifeshire (Fleming), Isle of Man (Forbes), Ireland (Thompson).

On the continent, in Germany (Pfeiffer), and in Sweden (Nilson).

Found fossil in the mammaliferous crag of the valley of the Thames (Morris).

PLANORBIS NITIDUS [The Fountain Coil Shell]. *Linnæus.*

Figures 101 and 102.

101.

102

A highly polished, smooth, pellucid, thin, fragile, amber-coloured shell, which was described by Lightfoot, in the year 1686, in the "*Phil. Trans.*" There are four convolutions, the body whorl very large in comparison to the preceding one. Upper disc very convex, lower disc flat. Umbilicated. Aperture of the form of the head of an arrow. Shell depressed.

Diameter two lines and a half.

Animal nearly black.

An abundant shell in clear stagnant water on aquatic vegetation.

M. Bouchard Chautereaux has observed that it lays from four to eight eggs at one time, which produce young in from ten to twelve days.

Our localities are the lake at Highfield House and a sheet of water at Radford Grove, in neither place abundant.

It is recorded as found at Bristol (Miller), Kent, Dorsetshire, and Wiltshire (Montagu), Essex (Sheppard), London (Grey), Norwich, occasionally abundant on confervœ (Bridgman), River Eythrope, Stone, Buckinghamshire (Reade), River Waveney, near Shotford Bridge, Northamptonshire (Bloxam), Newcastle (Alder), Cupar (Fleming), Scotland (Laskey), South of Scotland (Forbes). In Ireland, local, but widely diffused throughout the island (Forbes).

On the continent, in France (Draparnaud), in Germany (Pfeiffer), and in Sweden (Nilson).

Mr. Morris has found it fossil near London.

A difficult species to keep alive in confinement.

We are deficient of PLANORBIS LACUSTRIS [the *Segmentina lineata* of Grey], a common but very local species; and PLANORBIS GLABER [the *Planorbis lævis* of Grey], a very local shell.

It is possible that both these species may eventually be found in Nottinghamshire.

LIMNÆUS.

An interesting and widely spread family, with fragile shells, which are egg-shaped, or lengthened, thin, and dextral. Mouth generally ovate.

Notwithstanding the delicacy of the shell, it is procured fossil.

Found in streams, ditches, lakes, rivers, and mountain tarns.

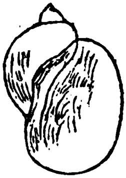
Some of the species are amphibious.

A curious property of walking which the house fly [Musca domestica] possesses is very remarkable, yet so familiar are we with the fact that we do not give our attention sufficiently to it; I mean that it not only walks in the ordinary manner, as on a table, but walks as easily head downwards on the ceiling of a room. A similar property belongs to this family of molluscs, for it as easily crawls upside down on the surface of the water, basking in the sun, as it moves in the ordinary manner on the surface of the mud.

The eggs are deposited in a glutinous mass, and are attached to stones, or submerged leaves and stems of aquatic plants.

LIMNÆUS AURICULARIUS [The Wide-mouthed Mud Shell]. *Linnæus.*

Figure 103.



More closely allied to Limnæus pereger than to any other species, nevertheless it is easily distinguished from that shell. It is much broader than L. pereger, Shell wrinkled, somewhat ovate, polished, horn-coloured, spire very small, brittle, transparent, and thin. The aperture capacious, with a strong columellar fold. There are from four to four and a half convolutions.

Length an inch, breadth three-quarters of an inch.

The animal is very similar to that of L. pereger, being dull greenish yellow.

Inhabits stagnant or slow waters.

It was first described by Dr. Lister, in the year 1678.

A widely spread, though local shell.

It lays from 60 to 100 eggs, which hatch in little more than a fortnight.

In this neighbourhood it is found in the Meeco-sic dike near Beeston, the River Trent in still places, the old canal at Wollaton, and in Clumber lake, according to Mr. Jeffreys.

Other localities are—Bristol (Miller), Kent, Dorsetshire, and Wiltshire (Montagu), Essex (Sheppard), London (Grey), Norwich (Bridgman), Swansea (Jeffreys(, River Avon and Kiver Kennet, Berkshire (Brown), Worcester, rare (Reece), River Waveney, near Shotford Bridge, Northamptonshire (Bloxam), Hartwell Park, near Aylesbury (Lowndes), River Eythrope, near Stone (Keade), York (Hinks), Kendal, in the canal, scarce and poor (Gough), Newcastle (Alder), Prestwick Car, small, and at Darlington, Durham (Alder). Abercorn Park, Scotland (Logan), Ireland (Thompson).

America (Grey), Germany (Pfeiffer), Sweden (Nilson), France (Draparnaud).

VAR. ACUTUS.

I feel strongly inclined to consider this a distinct species. It is smaller, smoother, more polished, paler in colour, outer lip of the mouth much stronger, very much polished internally, longer for its breadth, apex very sharp, body smaller, narrower, and the mouth of considerably less size. Length three-quarters of an inch, breadth half an inch.

It invariably keeps at the bottom of the water, crawling on the mud, never rising to bask at the surface like Limnæus auricularius.

It never lays more than 40 eggs at a time; these are deposited in three rows, in a glutinous envelope, and attached to decayed leaves at the bottom of the water.

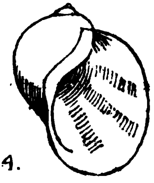
In this neighbourhood it has only been found in the lake at Highfield House, and even there not abundantly.

Some specimens sent from Bath by Lieut. R. W. H. Hardy were somewhat similar, but slightly more acute.

Limnæus auricularious is, according to Mr. Morris, found fossil in the fresh-water deposits near London.

LIMNÆUS PEREGER [The Puddle Mud Shell]. *Müller.*

Figure 104.



It is hardly possible to describe this shell, it is so varied in form and general appearance; it is, however, mostly acutely egg-shaped. Aperture projecting and capacious; body whorl very large. Fragile, wrinkled, thin, sharp but thin spire. Horn-coloured, or paler.

Length half an inch, but large examples are sometimes as much as an inch.

The colour of the animal is olive green, with dark marbling on the back.

Found in muddy brooks and clear rivers, everywhere abundant. I have procured it plentifully at Beeston, Attenborough, Sawley, Thrumpton, Clifton, Wilford, Lenton, Nottingham, Bramcote, Colwick, Basford, Bulwell, Linby, Newstead, Oxton, Stanton, Wollaton, Radcliffe, &c.

No British shell is more common than this species, or more widely distributed, so that it would be difficult to name a locality where it is not found.

There are several varieties distinct in character, the following are well known :—

VAR. OVATUS. Ventricose, straw-coloured, and more pellucid.

VAR. LINEATUS. Body whorl swollen; the shell marked with linear elevations, owing to internal indents.

VAR. LUTEUS. Shell stouter, mouth capacious, the spire sunken, colour yellow.

VAR. LACUSTRIS. Very short eroded spire.

VAR. MARGINATUS. Outer lip thickened and expanded, internal rib.

Mr. Millett has sent specimens of var. *lacastris* from Penzance, and Mr. Graham others from Darlington The variety *ovatus* is found near Beeston, in the Muscosic brook. Mr. Damon has sent var. *luteus* from Weymouth, Mr. Graham var. *marginatus* from Darlington, near Durham, and Mr. Millett var. *lineatus* from Penzance.

A very lengthened form of L. pereger, small in size, appears abundant; specimens have been sent from Penzance by Mr. Millett, from Hartwell Park by the Rev. C. Lowndes, from Stone, Bucks., by the Rev. J. B. Reade, from Thornley, Lancashire, by W. Winstanley, Esq., and from Darlington by J. Graham, Esq. I have met with this variety in the River Trent, at Newstead Abbey, and in the beautiful lake at Elvaston Hall.

Limnæus pereger frequently leaves the water to crawl upon the moist mud in the immediate neighbourhood.

The shells are often covered with a calcareous deposit.

This species generally copulates in August. Sixty to eighty eggs are deposited at one time.

First described by Dr. Lister, in 1678.

I have frequently examined the eggs of this species microscopically, and have never failed to observe the head and tentacles perfect in the youngest specimens. The action of the heart is very plainly visible.

In hot weather this *mud shell* is found in great numbers, basking on the surface of the water.

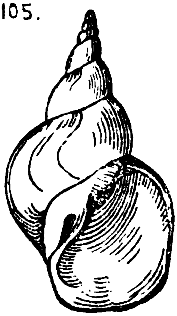
Found in Ireland (Thompson), Scotland (Forbes), Isle of Man (Forbes), Scilly Isles (Millett), Germany (Pfeiffer), Sweden (Nilson), France (Draparnaud), I. of Corsica (Payradeau).

Found fossil in the fresh-water deposits near London (Morris).

LIMNÆUS STAGNALIS [The Lake Mud Shell]. *Linnæus.*

Figure 105.

105.



The Lake Mud Shell is the largest fresh-water univalve of Great Britain. The form of the shell is an oblong-oval, the body whorl being very large and broad, and the spire acute. Mouth very capacious, and outer lip spreading. Strong columellar fold. Suture deep. Very thin and fragile for so large a shell. Horn-coloured.

The animal is yellowish-olive.

The usual size is 1½ inches long by an inch wide.

Specimens forwarded by the Rev. C. Lowndes from a still sheet of water in Dr. Lee's beautiful park at Hartwell, Buckinghamshire, are larger than I have seen from any other locality, the average length being nearly two inches by an inch and a line broad. The largest examples near Nottingham measure 1⅝ inches by 10 lines.

There are several varieties:—

VAR. FRAGILIS of Montagu is more slender and not so broad. It is not uncommon in this neighbourhood.

VAR. ROSEO LABIATUM of Sturm is thicker and has a purple throat.

An abundant and widely spread species, which is mostly found in stagnant water overgrown with water plants; occasionally met with in canals, brooks, and slow rivers.

Described by Merret, in his "*Pinax*," in the year 1667.

It is said to attain a very large size in the S.E. of Germany. In the Danube specimens are found four times as large as those procured in England.

Deposits from 100 to 130 eggs at a time. They are oval, and are marked with a yellow spot.

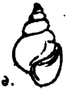
In this neighbourhood it is found at Stanton-on-the-Wolds in a small isolated pool; Beeston Ryelands in the River Trent, rare; in the Old Trent at Sawley, brooks at Lenton, and rare at Radford Grove.

Other localities are—Kent and Dorset (Montagu), Sussex (Paget), Essex (Sheppard), Norwich (Bridgman), London (Grey), River Waveney, near Shotford Bridge, Northamptonshire (Bloxam), Hartwell Park, Buckinghamshire (Lowndes), River Eythrope, Stone, Bucks. (Reade), Darlington (Graham), Newcastle (Alder), &c. South of Scotland (Forbes), Ireland, local (Thompson), Dublin (Brown).

On the continent, in France (Draparnaud), Germany (Pfeiffer), River Danube (Grey), Sweden (Nilson), I. of Corsica (Payradeau).

LIMNÆUS TRUNCATULUS [The Ditch Mud Shell]. *Müller.*

Figure 106.



106.

This interesting and pretty shell is very varied in form, so much so as to be formerly recognized as different species. It is the same species as the *L. minutus* of Draparnaud, Lamark, Nilson, Pfeiffer, &c., and the *L. fossarius* of Turton.

The shell is of a lengthened conical form, thin, shining, somewhat smooth, not brittle; apex small, pointed; mouth ovate, oblong, and capacious. Horn-coloured, or paler. It has six deeply-divided convolutions.

Length half an inch; breadth three lines.

The colour of the animal is brown, or leaden.

A common and widely-distributed species.

This shell was described by Montagu, in the year 1803, in the "*British Testacea.*"

Inhabits stagnant water and marshes; mostly found crawling on the wet mud in the immediate vicinity of water. It is even found high up on mountains in marshy places.

Var. minutus, not so large nor so tumid, less polished, and dull. This is the general form of Limnæus truncatulus found in this neighbourhood.

It lays from 15 to 20 eggs at a time.

Specimens have been sent from Scarborough by Mr. Bean, from Swansea by Mr. Jeffreys, from Penzance by Mr. Millett, and from Bath by Lieut. Hardy. Those from Bath and Penzance are very similar in form to those found in this neighbourhood, whilst those from Scarborough and Swansea are much more tumid, more shining, and having a deeper suture.

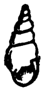
The Nottinghamshire localities are Lenton, Highfield House, Beeston, Thrumpton, Mapperley Plains around the small plashes of water, and at Sawley near the Trent Bridge. In the latter locality it is found in extraordinary numbers.

Other localities that may be mentioned are, Penzance rather rare (Millett), Bristol (Miller), Kent, Dorsetshire, and Wiltshire (Montagu), Essex (Sheppard), Whitlingham, near Norwich, rare (Bridgman), London (Grey), Stone, Buckinghamshire (Reade), Mill-pond, Ross, Herefordshire (Winstanley), River Trent, between Repton and Swarkstone Bridge, Derbyshire (Bloxam), Scarborough (Bean), Chaigeley Manor, near Clitheroe (Winstanley), Newcastle (Alder).

Isle of Man (Forbes), Ireland (Brown), France (Draparnaud), Germany (Pfeiffer), Sweden (Nilson), Corsica (Payradeau).

Found fossil in the mammaliferous crag near London (Morris).

LIMNÆUS GLABER [The 8-whorled Mud Shell]. *Müller.*
Figure 107.



107

Limnæus glaber more closely resembles Limnæus truncatulus than any other species. It is considerably more elongated, the mouth very small and acutely oval, spire gradually tapering to a point. It is shining, pale horn-coloured, and brittle. There are from seven to nine rounded convolutions.

Length usually five-eighths of an inch; and breadth three lines. Occasional examples are as much as an inch long.

Animal dark grey or blackish.

Found in still waters, and by no means a common shell.

Described first by Pennant, in his "*British Zoology,*" in the year 1777.

One specimen only has been found in this neighbourhood; it was dredged in the River Leen, at Bulwell, a very singular locality.

The following are recorded localities:—Penzance, Cornwall, where it is plentiful (Millett), Swansea, Cardiff, and Manorbeer (Jeffreys), Wiltshire, Somersetshire, and Staffordshire (Forbes), York, rare, (Hincks), Clitheroe (Reece), London (Grey), Kendal, one locality (Gough), Newcastle (Alder).

Rare in Ireland (Forbes), near Dublin (Brown), Belfast (Thompson), Cork (Humphrys. I am not aware that it is found in Scotland.

On the continent, in France (Draparnaud), Germany (Pfeiffer), and Sweden (Nilson).

Specimens have been received from Penzance from R. T. Millett, Esq., and from Swansea from J. G. Jeffreys, Esq. They do not differ much in different localities.

Mr. Morris has found it fossil in the fresh-water deposits in the valley of the Thames, near London.

LIMNÆUS PALUSTRIS [The Ditch Mud Shell]. *Linnæus.*

Figures 108 and 109.

108.

109.

A thick, strong, and lengthened oblong shell, with a spire tapering to a point. There are seven swollen convolutions, with suture deep. Nearly opaque. Minute umbilicus. Aperture suboval, and usually pink internally. Brownish horn-coloured.

Very variable in size! the largest specimens are an inch and a quarter in length, and 6½ lines wide. The finest specimen from Sawley did not exceed an inch in length.

The animal is of a leaden-black colour.

Described by Lister in 1678.

A widely spread species. Found in ponds, ditches, and marshes, mostly crawling on the wet mud close to the water.

It lays from 60 to 80 eggs at one time.

There are several varieties, the most distinct being the var. *tinctus* of Jeffrey, it is less in size, the spire shorter, wide, and the suture shallow. This variety is found sparingly at Lenton and Beeston. Very similar specimens have been sent by Mr. Jeffreys from Swansea.

The Nottinghamshire localities are Beeston Ryelands, Thrumpton, Lenton, and Sawley; in the latter locality it is very common and large.

The more distant localities which may be mentioned as examples are—Land's End, Cornwall (Millett), Kent, Dorsetshire, and Wiltshire (Montagu), Bristol (Miller), London (Grey) Essex (Sheppard), Swansea (Jeffreys), Norwich (Bridgman), River Waveney, near Shotford Bridge, Northamptonshire (Bloxam), Stone, Buckinghamshire (Reade), Repton, Derbyshire (Bloxam), Newcastle (Alder), Lytham, Lancashire, rare (The Author).

Ireland (Brown). Isle of Man (Forbes).

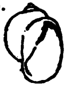
In other countries it is found in France (Draparnaud), in Germany (Pfeiffer), in Sweden (Nilson), and in Corsica (Payradeau).

In all probability it is an American shell, for the *Limnæa reflexa*, *L. umbrosa*, and *L, elodes* of Say appear to be varieties of this species.

LIMNÆUS GLUTINOSUS [The Glutinous Mud Shell]. *Müller*.

Figure 110.

110.



There are but few British shells so beautiful or so delicate as this species, better known perhaps as the *Amphipeplea glutinosa* of Nilson, Grey, Brown, &c.

Semiglobular in form, exceedingly thin, almost membranaceous, flexible, pellucid and well polished. Amber coloured. Aperture very capaceous and acutely egg-shaped. There are three and a half convolutions, but the body whorl occupies nearly the whole of the shell, the spire being very minute. There are faint longitudinal wrinkles. Devoid of an umbilicus.

Length half an inch, breadth three eighths of an inch. Specimens taken from Whittlesea Mere have been said to be three quarters of an inch in diameter. It is possible, however, that the *Limnæus Burnetti* may have been mistaken for it, for this latter named species has only recently been discovered.

The animal has marked characters to distinguish it from the others of the Limnæi. It is provided with large mantle lobes which when expanded cover the whole of the exterior of the shell. It is moreover, so very slimy as to be held with difficulty. The colour is sulphury green speckled with paler spots.

Inhabits stagnant ditches and still water amongst algœ, a scarce shell, yet periodically abundant in some localities. It deposits from 30 to 40 eggs at one time.

Described by Montagu in 1803.

In this neighbourhood it has only been found in one locality, a still sheet of water near the Trent, above the Beeston Ryelands, where it is occasionally plentiful, twenty or thirty specimens having been taken in one day, yet it is frequently difficult to discover a single specimen in a whole mornings search.

The following are the very few recorded localities of this shell:—Reading (Montagu), Eton and Deal (Goodall), Stanmore, Middlesex (Sowerby), Oxford (J. S. Miller), Norwich formerly plentiful now rare (Bridgman), Whittlesea Mere (Stephens), Bala Lake in North Wales (Gibbs), Scarborough (Beau), Windermere Lake in one place (Winstanley), Scotland (Laskey), Ireland (Brown), Sweden (Nilson), Syria (Grey).

Specimens sent by Mr. Damon, Mr. Jefferys and Mr. Fletcher did not differ from our examples.

We are deficient of two members of this family: viz.

Limnæus Burnetti, a rare and newly discovered species by Mr. Burnett in Loch Shem Dumfrieshire, since found in Breconshire.

Limnæus involutus. (The *Amphipeplea involuta* of Grey) very rare. Discovered by Mr. Harvey in a small lake on Cromaglaum Mountain near Killarney and not found elsewhere.

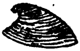
ANCYLUS.

The shells of this family (two species only of which occur in the fresh water of Great Britain) are patella-shaped, fragile, aperture lengthened-oblong or oblong, apex recurved. Margin entire.

The animal has a wide head with a pair of tentacles of a triangular form.

ANCYLUS FLUVIATILIS [The Common River Limpet]. *Müller.*

Figure 111.



111.

This is the Patella lacustris of Linnæus, Donovon Turton, &c., and the Patella fluviatilis of Montagu and Da Costa.

Described by Lister in the year 1678.

Somewhat conical, being nearly as high as broad. Having almost imperceptable striæ; apex far back, and bended over like a scrole, Margin acute; aperture roundish-oval; colour, pale-horn. The epidermis frequently encrusted.

Usual length three lines and breadth two lines and a half. The largest specimens taken near Nottingham are four lines long by three lines broad.

Animal, grey.

The animals usually copulate in August, and fix their spawn in globules containing many eggs on stones.

Common throughout great Britain. Inhabiting clear water, whether rivers or streams, mostly on stones; more rarely found in ponds.

The Nottinghamshire localities are a clear brook at Attenborough (rare); a brook at Highfield House; another on Oxton bogs; in the river Leen at Bulwell; the Trent at Beeston (rare); a well in the grounds at Newstead Abbey (small).

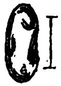
Other localities are, Penzance, poor (Millett), Bristol (Miller), Wiltshire (Montagu), Folkstone (Brown), London (Gray), on water plants in the river at Norwich, rather scarce (Bridgeman), river Eythrope Stone, Buckinghamshire (Reade), the Wharf, Richmond, Yorkshire (Winstanley), Chaigeley, poor, (Winstanley), Thornley, at the foot of Longridge Fell, very small (the Author), Kendal (Gough), Newcastle (Alder).

Scotland (Fleming), Ireland (Thompson), Isle of Man (Forbes), Germany (Pfeiffer), Sweden (Nilson).

Difficult to keep alive in confinement.

ANCYLUS OBLONGUS [The oblong lake Limpet.]. *Lightfoot.*

Figure 112.



112.

Described by Lightfoot in the year 1786, in the "*Phil. Trans.*"

Better known by some as the *Ancylus lacustris* of Muller, Turton, Thompson, Brown, Draparnaud, Nilson, &c.; by others, as the *Patella oblonga* of Lightfoot, Donovon, &c.; and by others, as the *Patella lacustris* of Montagu, and the *Valletia lacustris* of Grey.

Very fragile, thin, and much elevated; lengthened oblong form, with the side compressed. Apex acute and hooked.

Usual length a quarter of an inch, and breadth barely a tenth of an inch. The largest specimens obtained at Radford Grove, were 3¼ lines long, and 2 lines broad.

Animal dusky grey.

Local, but widely dispersed, clinging to the stems and leaves of aquatic plants (especially those of the water-lily and Lotus), in ponds, lakes, and canals.

Lays from five to twelve eggs, which hatch in from 24 to 26 days (Chautereaux).

The Nottinghamshire localities are a ditch (rare), a pond at Beeston Ryelands (rare), and in the sheet of water at Radford Grove (exceedingly plentiful on the Nuphar lutea and Nuphar alba).

More distant localities are Bristol (Miller), Wiltshire (Montagu), Essex (Sheppard), Sussex (Paget), London (Grey), Thames, Windsor (Brown), near Swansea (Jeffreys), river Waveney, near Shotford Bridge, Northamptonshire (Bloxam), river Eythrope, at Stone, Buckinghamshire (Reade), river Stour, Dorset, Windermere lake, and pool near Eccles Station (Graham), Newcastle (Alder), well distributed, but local, in Wales (Forbes), local but having a wide range in Ireland (Forbes), and only occurring in the south of Scotland, as in Duddingston Loch, near Edinburgh (Forbes), Naas (Brown), Belfast, Logan canal, and a pond at Moira, county of Down (Thompson).

Specimens received from Darlington, from J. Graham, Esq., and from Stone, from the Rev. J. B. Reade, did not vary from those found in this neighbourhood.

Described by Mr, Morris, as found fossil, with mammalia, at Grays, Erith, Copford, Sutton, or Ilford, on the banks of the Thames, near London.

AURICULIDŒ.

With but one exception inhabitants of brackish water. The shells are volutiform, having mostly denticulated mouths. The animals possess broad heads, with two nearly triangular horns.

CONOVULUS.

Spiral shells, aperture entire and denticulated, peristome thickened. We are deficient of this family; they comprise only two species, viz.:—

Conovulus bidentatus, widely spread, above high water mark.

Conovulus denticulatus, in the S. of England in a similar situation.

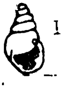
CARYCHIUM.

Only a single representative of this minute family is an inhabitant of Great Britain. It possesses a spiral cylindrical shell with a denticulated apertare.

Carychium minimum. [The Minute Sedge Shell.]

Müller.

Figure 113.



113.

First described by Mr. Boys.

Thin, minute, spiral, pellucid shell, of a creamy white colour; possessing from five to five and a half rounded convolutions with an obtuse apex and deep suture. Aperture semi-oval, and oblique, reflexed considerably, and furnished with three teeth. There are very faint longitudinal striœ. Length scarcely one line.

The animal is milky white, with huge black eyes at the internal bases of the two short cylindrical tentacles.

This almost microscopic shell is a common species, inhabiting moist situations amongst moss and grass, and under decayed leaves and wood.

Our localities are Stanton-on-the-Wolds, Sawley, Thrumpton, Newstead, Highfield-house, Beeston, Oxton, Wollaton, &c.

More distant localities are Penzance (rare Millett), Bristol (Miller), Kent, Dorsetshire, and Wiltshire (Montagu), Essex (Sheppard), Sussex (Paget), Norwich (Bridgman), Grantham (The Author), Stone, Buckinghamshire (Reade), Chaigeley, Thornley, and Lytham, Lancashire (The Author), Kendal (in a few localities, Gough), Newcastle (Alder), Isle of Man (Forbes)

On the continent in France, (Draparnaud), in Germany, (Pfeiffer) and in Sweden, (Nilson.)

Although so minute Mr. Morris has discovered it fossil near London.

CYCLOSTOMIDÆ.

Pulmonifera having an operculum.

Nottingham is deficient of this intererresting family.

They comprise:—

CYCLOSTOMA.

A spiral turreted shell with oval aperture and strong operculum. Only one British species, which is a large and strong shell.

CYCLOSTOMA ELEGANS.

This handsome species is [illegible] a southern shell although found in Yorkshire, and in one locality near Kendal.

ACME.

Turreted cylindrical shell with egg-shaped aperture and thin operculum, only one British member.

ACME LINEATA.

Better known as the Acme fusca (of Grey), a rare but widely spread minute shell.

Probably either this or the preceding species may eventually be added to our local catalogue.

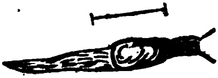
This concludes our list of land and fresh water shells.

APPENDIX.

LIMAX BRUNNEUS. [The Brown Slug.] *Draparnaud.*

VARIETY PYGMŒUS.

Figure 114.



114.

Since that section of this work has been published, which contained descriptions of that portion of British slugs which have been found in Nottinghamshire, another species has been discovered in this locality. The interesting addition to our slugs is the but little known *Limax Brunneus.*

Owing to its habits, it is very seldom observed which may account for the paucity of localities enumerated.

This species as found here differs from the ordinary type of Limax Brunneus in being more slender, not half the size, and of a paler colour. In the ordinary form it often approaches nearly to black, and is as much as an inch in length when crawling. These features are sufficient to warrant its being called a *distinct variety,* and as it is the smallest British slug known, I have thought *var. pygmœus* would be an appropriate name

This variety is in colour a uniform chocolate-red, the body, shield, and head being of the same hue. In some specimens it is rather paler around the breathing orifice.

The shield is wrinkled concentrically, is rounded behind, and large, occupying nearly a half of the length of the animal. When the slug is resting the shield becomes a prominent object owing to its being considerably elevated. The back of the animal [except near the tail] is circular, about the tail it is keeled, and ends in an acute point. Sometimes when crawling it will curl up the extremity of the tail. The mucus is transparent and copious. The animal is slender, being narrow for its length. Tentacles long and transparent, The shell is oval and thick. Sole of the foot reddish-grey. Length when crawling barely half an inch. It has the power of suspending itself by a mucous thread.

Chiefly procured, according to Mr. Alder, in damp woods; in this locality it is found under stones, and at the roots of the sedge-grass, close to the water's edge.

M. Chautereaux says it lays from twelve to eighteen transparent and colourless eggs, in from six to eight days. The young become fully grown in seventy days.

It is a very active species, crawling about rapidly. It must be considered one of our rarer slugs.

In this neighbourhood it is found by the edge of the lake at Highfield-house, but not very abundantly.

The more distant localities are: in the N.E. of England [Alder], and in the Isle of Skye [Thompson.]

LIMAX ARBORUM [continued from page 54.]

In rainy weather the apple trees at Highfield-house are covered with this slug from the bole to a considerable height. It is also common on the bridge over the brook at the base of the Beeston-hill. I have found it plentifully on the alder-trees at Chaigeley, in Lancashire, and Mr. Bridgeman has noticed it at Norwich.

Individuals attain as much as four inches and a half in length. This is a hardy slug; in the present year [1852] it was crawling about on the 24th of December.

ARION FLAVUS [continued from page 50.]

Not uncommon at the roots of the sedge-grass at Highfield-house, near the lake. I have also found it abundantly amongst moss and lichen, at Chaigeley Manor, Lancashire.

PISIDIUM AMNICUM [continued from page 12.]

Laterly I have dredged this species in abundance in the Trent at Beeston Rylands.

UNIO TUMIDUS, UNIO PICTORUM, AND DREISSENA POLYMORPHA, &c. [continued from pages 20, 22, and 17.]

The following brief account will prove sufficiently interesting to warrant its being inserted in the "appendix:"—

At Hooley's Wood, Wollaton, in the old canal, I last summer found myriads of Dreissena polymorpha clinging together on the sides of the lock in clusters some inches thick. They were of good size, and some specimens were pale and striped with blue.

There were also fine specimens of Unio pictorum, and exceedingly large ones of Unio tumidus, some measuring as much as 3$\frac{2}{8}$ inches in length. This canal has not been used of late years, and has become stagnant and overgrown with algæ and other water plants. The specimens procured of Unio pictorum were alive, but the whole of those obtained of Unio tumidus were *dead*, and though in a good state of preservation, the epidermis was coated over with a black and shining incrustation, evidently owing to their being embedded in a black boggy soil, and to the decomposition of the water plants. This interesting discovery clearly illustrates that Unio tumidus cannot live in stagnant water; it had flourished as long as the canal was a running stream, but when it became unused, and the water stagnant, this species perished. Indeed, when I have endeavoured to keep Unio tumidus in confinement, it has soon died; whilst Unio pictorum would, under similar circumstances, live for a lengthened period.

In the same canal were found the following species: —Anodonta Cygnea, Paludina vivipora, Limnæus stagnalis, L. Auricularius, Bithinia tentaculata, and Physa fontinalis.

LOCALITIES OF MOLLUSCA.

To illustrate which species will live associated together, the following short extract from my "Note Book" is appended.

The dike which runs at the foot of Beeston, near that village, contains a thick deposit of decomposed animal and vegetable matter; the shells found in it are Planorbis corneus, P. marginatus, P. vortex, Physa-hypnorum, Valvata cristata, Cyclas caliculata, and Pisidium pusillum; lower down, the stream becomes clear, and the shells are very different: they are Physa fontinalis, Limnœus pereger, L, truncatulus, Succinea putris, var Pfifferi, Planorbis vortex, and Cyclas cornea.

Under the *seven arches* in the Nottingham Meadows the shells procured are Planorbis carinatus, P. vortex, Bithinia Leachii, B. tentaculata, Ancylus oblongus, Limnœus pereger, and Cyclas cornea.

In the river Trent, at Beeston Rylands are the following:—Pisidium pusillum, P. amnicum, Cyclas cornea' C. rivicola, Anodonta cygnea, Unio tumidus, U. pictorum, Valvata piscinalis, Planorbis carinatus, P. vortex, Limnœus pereger, L. stagnalis, L, palustris, Bithinia tentaculata, Ancylus-fluviatilis, Physa fontinalis, Neritina fluviatilis, and Paludina vivipora.

In the lake at Highfield House are, Anodonta cygnea, Unio pictorum, Dreissena polymorpha, Limnœus auricularius, Planorbis albus, P. nitidus, P. imbricatus, and P. vortex.

On the bogs at Oxton, Helix fulva, H. hispida, H. pulchella, H. rotundata, Zonites nitidus, Z. purus, Arion flavus, Vitrina pellucida, and Zua lubrica.

At Radford Grove are:—Anodonta cygnea, Cyclas cornea, Pisidium pusillum, Bithinia tentaculata, Valvata cristata, V. piscinalis, Succinea putris, Limnœus pereger, L. stagnalis, Physa fontinalis, Ancylus oblongus, Planorbis albus, P. vortex, P. carinatus, P. marginatus, P. nitidus, and P. contortus.

Immediately around Highfield House are found, Arion flavus, A. hortensis, A. empiricorum, Limax agrestis, L. brunneus, L. cinereus, L. arborum, Vitrina pellucida, Zonites cellarius, Z. nitidus, Z. crystallinus, Z. alliarius, Z. purus, Z. nitidulus, Z. radiatulus, Helix nemoralis, H. pulchella, H. hispida, H. virgata, H. rotundata, H. fulva, H. aculeata, H. pygmœa, Bulimus obseurus, Zua lubrica, Azeca tridens, Pupa umbilicata, P. pygmœa, P. substriata, Clausilia nigricans, Carychium minimum, Balæa fragilis.

Innumerable localities might be cited, but the above ones will sufficiently show what is intended.

TABLE OF THE WEIGHTS OF LAND AND FRESH WATER SHELLS FOUND IN THIS NEIGHBOURHOOD, IN GRAINS AND TENTHS OF GRAINS.

(The Number in the Second Column, when only One, implies that on the average each Specimen weighs what is given in the Third Column, and when the Number in the Second Column is Three or upwards, it implies that it requires the Number of Specimens given to weigh One Grain.)

Name of Shell.	No. of Specimens weigh.	Weight in Grains.
Auodonta cygnea	1	1870
— cygnea var. Ponderosa	1	1590
Unio pictorum	1	558
— tumidus........	1	316
Dreissena polymorpha	1	79·2
Cyclas rivicola	1	21·0
— cornea	1	1·5
— caliculata	1	0·4
Pisidium amnicum ..	1	1·3
— nitidum	20	1·0
— Henslowiana	1	0·2
— cinereum ..	1	0·2
— obtusale	1	0·2
— pulchellum .	1	0·1
— pusillum....	16	1·0
Paludina vivipora	1	63·0
Bithinia tentaculata..	1	1·5
— Leachii	11	1·0
Valvata piscinalis....	1	0·4
Neritina fluviatilis ..	1	2·0
Succinea putris	1	1·7
— Pfeifferi	1	0·8
Physa hypnorum	1	0·4
— fontinalis (large variety)......	4	1·0
— — (small variety)......	10	1·0
Ancylus fluviatilis....	5	1·0
— oblongus	30	1·0
Limnœus glutinosus..	12	1·0
— stagnalis(Nots)	1	11·0
— — (Bucks)	1	22·0
— palustris......	1	3·5
— auricularius ..	1	7·0
— acutus	1	8 0
— pereger	1	8·0
— glaber (Cornwl)	1	0·5
— — (Bulwell)	1	0·4
— truncatulus.. (Scarbro')..	1	0·5
— — (Notts)	1	0·4
Planorbis corneus....	1	11·5
— marginatus.	1	3·0
Planorbis albus	7	1·0
— carinatus..	1	1·0
— spirorbis ..	1	0·2
— vortex	1	0·3
— contortus..	1	0·1
— nitidus	20	1·0
Helix nemoralis......	1	22·0
— hortensis......	1	8·0
— nemoralis (a yellow variety)..	1	14·0
— aspersa........	1	36·8
— arbustorum....	1	5·0
— ericetorum .. .	1	6·0
— caperata (Notts)	1	0·7
— — (Cornwall)	1	0·8
— — var. (Norwich)....	1	1.3
— hispida	1	0·9
— rotundata......	1	0·8
— revelata	1	0·2
— sericea	1	0·6
— pulchella......	27	1·0
— aculeata	42	1·0
Zonites cellarius	1	1·5
— crystallinus ..	37	1 0
— alliarius	6	1·0
— radiatulus ..	16	1·0
— purus	16	1·0
— nitidus	1	0·4
— excavatus....	1	0·2
— nitidulus	1	0·2
Clausilia nigricaus....	3	1·0
Vitrina pellucida	25	1·0
Bulimus obscurus ..	1	0·3
Achatina acicula......	50	1·0
Carichium minimum..	133	1·0
Pupa umbilicata......	26	1·0
— pygmœa	40	1·0
Zua lubrica..........	9	1·0
Azeca tridens	6	1·0
Balea fragilis (Cornwall)..	17	1·0
— — (Yorkshire)	8	1·0
— — (Notts.) ..	13	1·0

The above table points out some interesting facts: whilst Anodonta cygnea var, Ponderosa weighs 1590 grains, Carichium minimum only weighs the 133rd part of a grain; thus it requires 211,472 specimens of the latter to weigh as much as one specimen of the former.

A second fact shown, is that certain species attain a much greater weight in one locality than in another. Thus Limnœus stagnalis is double the weight in a sheet of water in Hartwell Park [Bucks.], to what it is near Nottingham; in the former place being 22 grains, whilst in the latter it is only 11. A variety of Helix caperata, found near Norwich, weighs nearly double what that species does as found here.

Balea fragilis appears to flourish best in our colder northern counties, for at Penzance 17 specimens are required to weigh one grain; near Nottingham, 13; and at Reeth, near Richmond, Yorkshire, only 8.

The difference in the weight of two species found in the same locality is so great, that it is possible that, instead of proving only varieties, as now considered, they may eventually be found to be two distinct species. The first is, Physa fontinalis, the large var. weighing a quarter of a grain, and the small var. only a tenth of a grain. The second is Helix nemoralis, weighing 22 grains, whilst the var. Hortensis only weighs 8 grains. A pure yellow var. of H. nemoralis, almost equal in size to the common form of H. nemoralis, weighs 14 grains. The weight of some species is considerably greater than others of much larger size; thus Neritina fluviatilis weighs 2 grains, whilst Planorbis carinatus only weighs one grain. It takes 25 specimens of Vitrina pellucida to weigh a grain, whilst only 16 are required of Pupa umbilicata to weigh the same.

The above table, although made with great care, and the scales employed of excellent adjustment; yet, no doubt some slight alterations may be required, especially as most of the species weighed are solely from specimens procured in the neighbourhood of Nottingham.

CONCLUSION.

Having brought the history of the land and fresh water shells of the county of Nottingham to a termination, it has been thought desirable to say a few words in conclusion.

Whatever branch of the created world we examine and reflect upon, whether it be animate or inanimate, there is something in the construction to wonder at and to admire, some grand law of nature which displays the wisdom of the Almighty.

If we turn to the inanimate world we observe various strata of rocks owing their existence either to fire or water. The plutonic and volcanic are produced by the action of fire, and in this series the granite rocks must be familiar to every one. Charnwood forest is the example in our neighbourhood. A volcano has been ages ago raging deep in the earth in that part of Leicestershire: let us hope that it will not burst forth from its slumbers to activity of life, In this series all animal form is destroyed, no fossils are to be found, the rocks have once been liquid, and it must not be forgotten that we are even now but living on a crust of land: a few miles beneath us are immense oceans or lakes of liquid fire. Wonderful have been the changes which have occurred before this earth assumed its present calm and beautiful form. Endless have been the animal and vegetable life which have lived and perished to give place to others, which in their turn have perished also; until at length man has been called into being, to fulfil his appointed time. "All is change! all is variable! save the laws by which they are governed, and He who framed them."

The aqueous or stratified rocks are due to the action of water, and we must not suppose that this action has ceased to be; fire and water are in action still, the rocks continue to grow as of old, mountains are formed, islands rise out of the sea, and in its turn the sea claims possession of the land. The plutonic rocks formed deep in the bowels of the earth, become crystalized and cooled, and then by elastic force of internal heat forced upwards. Granite rocks are likewise fused deep within the earth, and are not forced upwards until they are cooled. We are indebted to fire for basaltic rocks, our greenstone, porphyry, and serpentine.

The aqueous rocks are the particles washed by the rain into the rivers and carried into the sea, thence to become solid, and to be raised by subterraneous forces.

In the *lower Silurean* epoch occurs as fossil the Trilobite, stone lily and extinct fish. In the *upper Silurean* many *sea shells*, corals, fish, and marine algæ. At this period the world was considered to have been of a similar heat throughout its breadth. The northern hemisphere was a vast sea, yet land occurred in North America. Towards the close of this epoch earthquakes and volcanoes were very active.

In the old red sand-stone or Devonian epoch, fossils again occur. A warm and tranquil atmosphere prevailed throughout the world, and the land of the northern hemisphere teemed with tropical vegitation, These grand forests were eventually submerged, blending with clay and sand consolidated to produce our coal. In the magnesian limestone animal remains are found, above occur the mountain limestone, and uppermost the new red sand-stone, dispersed with salt and gypsum, &c.

After a lapse of time remarkable for its tranquility, the oolite epoch commenced, swarming with fossil remains: the water greatly charged with carbonate of lime towards its close produced the cliffs of chalk. We have in this series belemnites and ammonites. A change of climate next took place. The deposit of shells and coral producing the cretaceous strata. Great was the lapse of time from this epoch, till the commencement of the tertiary epoch. All the plants and animals of the secondary had ceased to live, and a new series occupied their place approaching nearer to those which now exist. The lowest tertiary [Eiocene] was warm, the plants of the tropics flourished in England, and the epoch swarmed with life; above this is the Meiocene also swarming with life; and next the Pleiocene with even more life. The great bulk of the land of this hemisphere during the tertiary epoch rose above the sea, producing a diminution of temperature to a great extent, the tropical vegetation perished, and the seas of Europe teemed with icebergs at the close of the Pleiocene epoch. At this period the erratic boulders were brought from Norway and Sweden frozen to icebergs, and deposited on our island by the melting of the ice around them.

The extent of the fossiliferous strata of the world is considered to be nearly eight miles in thickness: this enormous mass being produced by the gradual deposits of rivers. To show what ages have elapsed since the creation of the world, geologists have calculated that it would take fifteen million years to double the thickness of the fossil strata of the world. Man is thus but as yesterday in comparison with the creation of the world.

It is to the tiny shell that we are indebted for our calcareous rocks: thus geology is intimately connected with conchology.

In ages remarkable for great disturbances, disturbances which destroyed all animal and vegetable life, how glorious is the thought, that although they should perish, that many should be changed to stone, as illustrations of types which occurred before the age of man. Illustrations of nature preserved for man, to ponder over, to marvel at, and to admire, If we turn from the inanimate to the animate world, whether it be to insects, to birds or to beasts, we have many striking proofs of the power and wisdom of the Creator.

The transformations in the insect world are wonders well deserving our attention. The common gnat deposits its eggs in the water soon to become active denisons of the stream, yet but for a short period; after a time they rise to the surface each as a crysalis, which is speedily burst open to set free a winged creature, whose second existence is destined to skim about the air. Although this creature was the same insect in both existences, yet if in the first, we took it from the water it speedily perished, whilst during its second life immersing it in the stream would as speedily produce its destruction! What a change must take place in its mode of breathing. The lava of the butterfly or beetle crawling in the soil, or feeding on the leaves of flowers, how different to its second life, in the one slow motioned and unsightly, in the second winged and beautiful, darting through the air with inconceivable rapidity.

How various are the habits of different species; the common brown butterfly skiming along the ground, and the Purple Emperor [like the lark] soaring high into the air to meet the rising sun. How different are the habits of the mid-day butterfly to that of the midnight moths the one rejoicing in the sunbeams, the other hiding till the gathering darkness of night invites it forth.

How unlike, the life of the may-fly to that of the church-yard beetle, the former living but a day, while the latter survives a three years fast.

How dissimilar the lazy wasp to the industrious ant, the one enjoying but the pleasures of the present, the other thoughtful for the future.

What maternal care in the spider, who carrying its egg-bag on its back, prefers rather to perish than to lose it.

What instinct in the Ichneumon fly, who deposits her eggs in the back of the living caterpillar, to be eventually hatched to feed upon the crysalis of the butterfly, and in course of time the crysalis to bring forth a winged creature, the usurper, not the ill-fated butterfly. What wonderful properties are possessed by some insects, such as deposit eggs within the tender branches of trees, the injuries caused producing various curious appendages, as the oak-apple and the scarlet ball of the wild rose (or rose gall), or more singular still, to make the willow blossom like the rose.

How wonderful are the chiseling of the stone mason moths and the carpenter bees, the excavations of the architectural beetle, the net of the spider, the lamp of the glowworm and electric centipede, and the extraordinary jumping power of the grass hopper and the flea. We have caterpillars that are hammock weavers, tent makers, leaf marchers, and posture master, carpenters miners, flask makers, and muff makers, &c.

How curious the transformation of the tadpole to the toad, the former a ball like looking animal, with a long fanshaped tail, living in water, and gradually increasing in size, until after a time the tail falls off, legs appear, and speedily a well shaped toad is formed, but how different its existence now, no longer can this animal live in water, it hastens to the side and becomes an inhabitant of the land.

Turning to the birds, how marvellous is the migration of various species. Our summer birds, the swallow, the cuckoo, or the corncreak, leaving when the winter's cold sets in; and our winter birds, the red-wing or the fieldfare departing on the first approach of spring.

What a want of maternal affection is displayed in the cuckoo, who lays her eggs in the nest of the hedge-accentor or the lark, to be brought up by a stranger mother.

How various are the forms of the nests of birds, yet each species always so much alike as to be easily recognized.

How different their habits, the sparrow or the red-breast the companions of man, to the fell-ousel or the kingfisher shunning his approach.

How curious that the female chaffinch should depart in winter leaving the male behind.

The instinct of the butcher bird in empaling its captured meat until tender enough for food. The dread which other birds have of a hawk; the chicken but just hatched, although it will take no heed of a turkey, or a crow, will be terrified on the approach of a hawk.

These comparisons and facts of so much interest, might, if space allowed, be much enlarged; there are also others of the animal kingdom from which we derive great comforts, to the cow we are indebted for milk, to the bee for honey, and to the hen for eggs, these every-day comforts are so familiar that it is forgotten there is anything wonderful respecting them. Sufficient has however been said upon this subject in illustration of the interest to be derived from the investigation of the various branches of natural history.

It may not seem amiss to offer a few remarks on the economy of the shells which we have now described, an economy which is as beautiful as it is perfect. It is a known principle of nature that a species does not depart from its own law of formation, i. e. each shell from generation to generation is found precisely alike, and there are twelve thousand species at the present time living on this world, each obeying this same law, yet each in a different manner, and before these existed fifteen thousand species inhabitants of the old world obeyed a similar law.

It is to the animal which has once occupied the shells in our cabinets that we are indebted for them, therefore the interest attached to their economy is very great, Each shell, whether it be a bivalve or a univalve is the aggregate working of an endless number of diminutive membranous cells less mostly than the thousandth part of an inch in diameter, these contain in their tiny cavities the crystalline carbonate of lime by which they are formed; this lime proceeding from the food they live upon. How wonderful must be this law of nature, when we reflect that each species produces shells always so exactly alike as to be at once recognized, and when we further consider the endless diversity of form and colour, it is in the highest degree exulting to ponder on the wisdom therein displayed of an all-wise Creator.

The bivalves are lowest in the order of creation possessing no actual head. The blood of all molluscs is white, and the animals crawl upon their bellies although it is customary to call this portion of the animal the sole of the foot. Some species masticate their food with teeth, others suck in their nourishment.

It may be interesting to know from what the family name of some of the shells have been derived. Thus ancylus is from the latin *ancile*, a sacred shield; anodonta, signifying without teeth; clausilia from *claudo* to shut [in reference to the power of shutting itself within the shell]; cyclas, orbicular; helix a spiral line; limax a slug; niritina hollow; paludina from *palus* a marsh; patella from a pearl; valvata from *valva* a folding door; and vitrina from *vitrum* glass.

Mollascous animals have soft bodies, and are destitute of bone, they are mostly provided with a shell. Mr. Alder, of Newcastle, has made observations on the pulsations of various mollusca, and he finds in Vitrina it is 120, and in the Nudibranchs 60 to 80.

In the inland tribes there may be traced a gradual series in the formation and perfection of their shells. Commencing with the Arion, which has separate small granules placed within the mantle of the animal; the Limax, with shelly shield also within the mantle; the Testacella, having a small shell at the tip of the tail; the Vitrina, a shell not large enough for the animal; the Zonites, quite large enough for the animal, but with no thickening around the aperture; the Helix with a well-formed shell reflexed at the mouth; the Cyclostoma, not only thickened, but provided with an operculum; and the Clausilia with a valve which closes when it retires within the shell.

Mollusca fall a prey to many hungry creatures; the water tribe are a food for fish and wild fowl, whilst the land slugs are devoured by the thrush, the lava of the glow-worm and some beetles.

Molluscous animals have a heart with arteries and veins for the circulation of their blood, organs for breathing, eyes for seeing, organs for hearing, for smelling, and for tasting, and organs for the digestion of their food.

Great is the instruction and interest derived from an investigation of specimens of natural history, and to no branch is there more interest attached than to conchology, the elegance and diversity of form, the various habits, and the many species found in and around the Bitish Isles, render this section one of peculiar attraction. Where leisure and inclination are combined, a collection made by a personal search proves the most instructive and interesting; but to those not possessing that leisure, or for such species as are not found in localities near the collector, it is desirable to purchase those desiderata, and it is fortunate that at this time several persons and one society are devoted to the formation of collections of shells. The society to which allusion is made is that of the "British Natural History Society," York, where most beautiful collections of both recent and fossil shells can be procured at a price exceedingly reasonable. The secretary, E. Charlesworth, Esq., a well-known geologist (to whom I am indebted for many valuable specimens), would give every information required. The dealers alluded to are Mr. Robert Damon, of Weymouth, and Mrs. Branscombe, the wife of a poor fisherman, at Exmouth; both these persons are very reasonable in price, as I have myself proved.

A collection of shells is now being added to the Nottingham Museum, in which the whole of the species described in this work will be included. The collection will combine both *Land* and *Fresh-water*, and *British Marine* species. The arrangements and nomenclature of the shells which is left to my care will be that which is adopted by Professor Forbes. The other branches of Natural History, Geology, Mineralogy, &c., will also be rearranged, and greatly added to, that the Museum may be made, in the several branches, a school for study.

Since writing the *Introduction*, several scientific terms have, of necessity been used, which were not in it explained; amongst these are *apex,* the point of a shell; *columella*, or *pillar*, the internal support of most spiral shells, around which the whole convolute; *dextral,* when the mouth of a spiral shell is on the right hand side, *sinistral* when on the left; *hyaline,* thin or glassy; *lunate*, crescent, or half-moon shaped; *reflected*, or *reflexed*, folding back, as in the thickened outer lip of Helix aspersa, &c. In measuring the dimensions of shells, they have sometimes been expressed in lines; a line is the twelfth part of an inch.

The present treatise has been written in as popular a mannar as the subject would admit of. In taking a farewell of the Nottinghamshire Mollusca, I cannot refrain from expressing a hope that others may be induced to commence this study. The great pleasure, experienced in the investigations which I have made makes me feel convinced that others would have a similar interest, after having fully entered into the subject,—an interest rendered the more intense from a knowledge that all the wonderful facts which have been noticed, obey certain laws, imparted to them by the Great Lawgiver—the Creator of the world and all that it contains.

"Most beautiful the earth is yet, and beautiful 'twill prove,
While one single God-made creature remains its charms to love;
'Tis man's own sickly blindness makes the world deformed alone;
Who know it most, see beauty most; who know it least, see none."

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(Those names printed in italics are either varieties only, names used by other authors, or are marine species.)

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ERRATA.

The artist has inadvertently neglected to transpose the following diagrams, therefore they should be viewed through a mirror for each to appear correct:—*Figures* 12, from 14 to 21, 31 to 44, 48 and 49.

Page 4, line 19, page 5, line 4, for *Limneus* read *Limnæus.*

Page 5, lines 6 and 13, page 38, line 13, for *Planorbis cornea* read *Planorbis corneus.*

Page 5. line 6, for *Helix lucida* read *Zonites lucidus.*

Page 10, lines 11 and 12, page 12, line 25, page 16, line 12, page 62, line 10, page 63, line 30, page 82, line 3, for *Millet* read *Millett.*

Page 10, line 13, for *Kendall* read *Kendal*·

Page 19, 3rd line from bottom, for *us* read *me.*

Page 23, line 8, for *inches* read 3 *inches.*

Page 27, line 27, for *fron* read *front.*

Page 31, line 23, for *does* read *do.*

Page 33, last line, for *he* read *the.*

Page 34, line 21, for *calcereus* read *calcareous.*

Page 35, line 2 from bottom, for *Paludinæ* read *Paludina.*

Page 49, line 31, for *band* read *bands.*

Page 51, line 10, for *representation* read *representative.*

Page 53, line 9, for *the conchologist* read *this conchologist.*

Page 61, bottom line but one, for *Helix cellaria* read *Zonites cellarius.*

Page 30, bottom line but one, page 53, line 4, page 75, line 17, page 86, line 16, page 88, line 5, for *Chatereaux* read *Chautereaux.*

Page 56, line 6, for *Bauchard* read *Bouchard.*

Page 113, line 5, Clausilia plicatula is the Clausilia Rolphii of Grey, it is accidentally inserted in line 6 with Clausilia biplicata.

R. SUTTON, PRINTER, NOTTINGHAM.